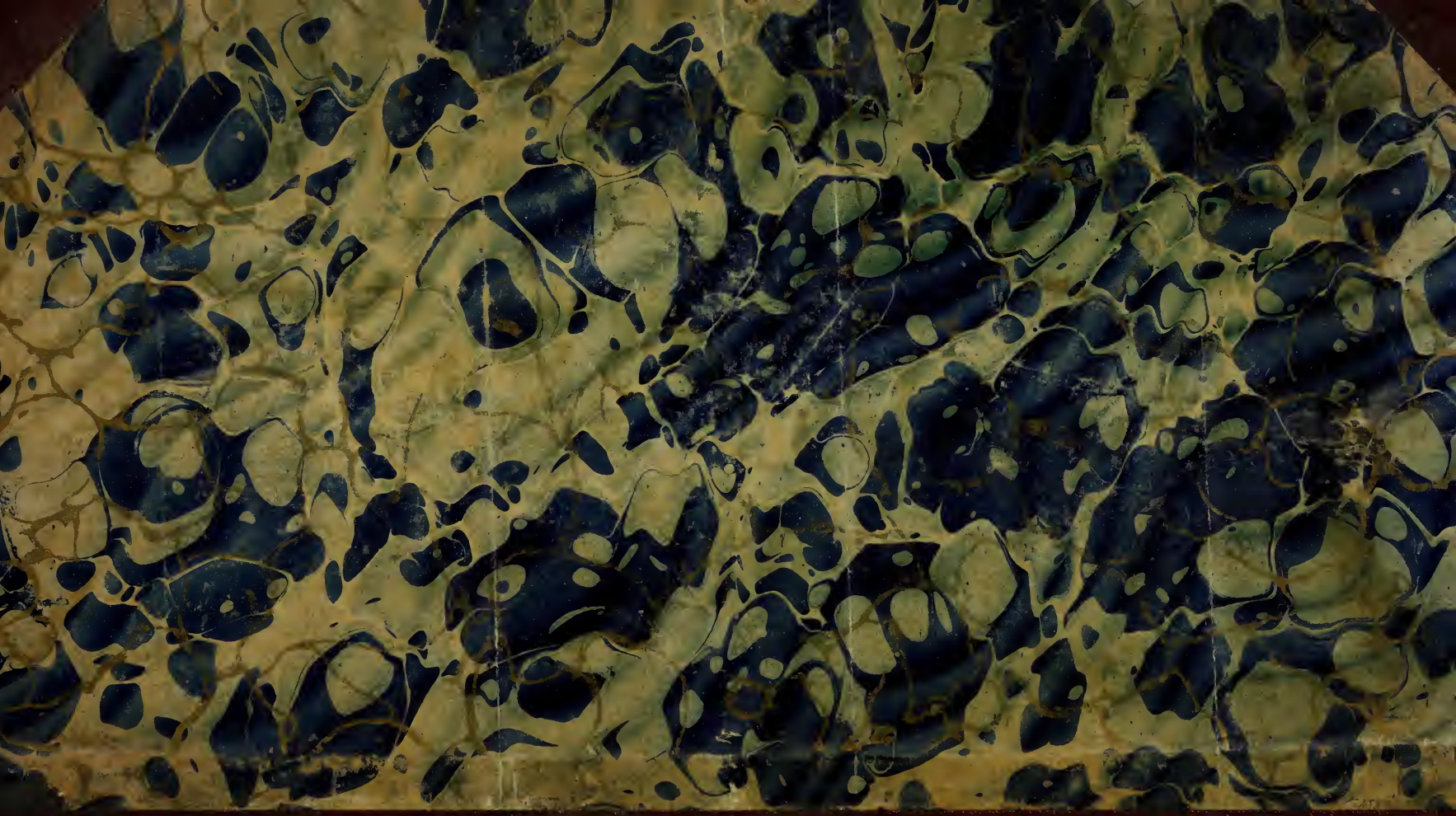


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Report of the State Engineer.

Helena, Montana, November 30th, 1912.

To His Excellency,
Hon. Edwin L. Norris,
Governor of Montana.

Sir:—

I have the honor to submit for your consideration, the Fifth Biennial Report of the State Engineer of Montana, embodying such recommendations as to me seem advisable, together with a summary of the water records of all streams measured in the state up to December 31st, 1911, and such other data bearing upon the Water Resources of Montana as time and available funds will at this time permit. It has not been the custom of this office to publish this information, and it has therefore, been necessary to search all records from the time of the first stream measurement made in the state, in order to bring the data down to the latest possible date. It is impossible to get out computations on the stream measurements for the year 1912 in time for this report, and I have made all Water Resource data correspond, as near as may be to that of the stream flow, so that this data is only complete up to and including the year of 1911. Requests for information of this nature are being continually received by this office from all over the United States, and especially the east and middle west, from people looking for investment.

I also embody a report of the Montana Carey Land Act Board, as its official Secretary in behalf of said Board.

Duties Performed.

The duties of the State Engineer of Montana have to do principally with the Carey Land Act Irrigation Projects in the State; in supervising all work, either proposed or in active course of construction; approving all plans for reclamation where same are feasible and passing upon the feasibility of same, together with the approval of all plans for individual structures on each Project, thus making the duties really those of a Supervising Engineer. The details of what has been done and what has been accomplished in this work, will be set forth more fully in the Carey Land Act Board report.

Another duty of the office has been the supervision and direction of the stream gauging work done under State Appropriation, the detail of which is set forth under a separate heading.

Other work of the office has consisted of membership of the Contest Board of the State Land Office; field work for the State Land Office on

state lands, townsites, etc., together with engineering work and reports for and in behalf of the State Board of Examiners where engineering plans and information have been required.

The details of this work for other Boards and Departments, while important and consuming much time and work, are more of the nature of routine work of these departments and so will be unnecessary to enumerate here and encumber this report. The expense of this office and that of special deputies which have been necessary from time to time on this special work, is also unnecessary to enumerate, as it will appear in the report of the State Auditor under the head of expenditures of the different Departments for which services have been performed.

All expense incurred on Carey Land Act work has been charged direct to the Carey Land Act fund. Approximately two-thirds of the time of the State Engineer has been spent upon Carey Land Act work and that portion of the salary of the office is therefore directly chargeable to that fund, which comes direct from the sale of the "Carey" lands.

Acknowledgements.

Much of the data herein compiled, has only been possible of access through the cooperation of others and acknowledgements are due to the Water Resource Branch of the U. S. G. Survey; the U. S. Forestry Service; the U. S. Reclamation Service; the Montana Agricultural College; the Montana Society of Engineers; the Butte Electric and Power Company, and also to the Montana Carey Project Companies, who have maintained the gauge observers of their several Projects.

Irrigation.

The subject of irrigation in Montana is a large one and is a matter of the gravest importance to the State. Under our present laws the State has no supervision or means of obtaining official data on this subject, except in the matter of "Carey" Projects and such information as is given through the courtesy of the U. S. Reclamation Service. The subject is, however, so well covered in Government and Experimental Station Reports, that little could be added without a greater scope of authority, to which reference is made under the head of "Water Rights." A superficial investigation of private irrigation projects and ditches in the State under present conditions would be of little value.

Such information as we have, regarding U. S. Reclamation Service Projects, will be given in the "Water Resource" section of this report, while the "Carey" Projects will appear in the Carey Land Act Report.

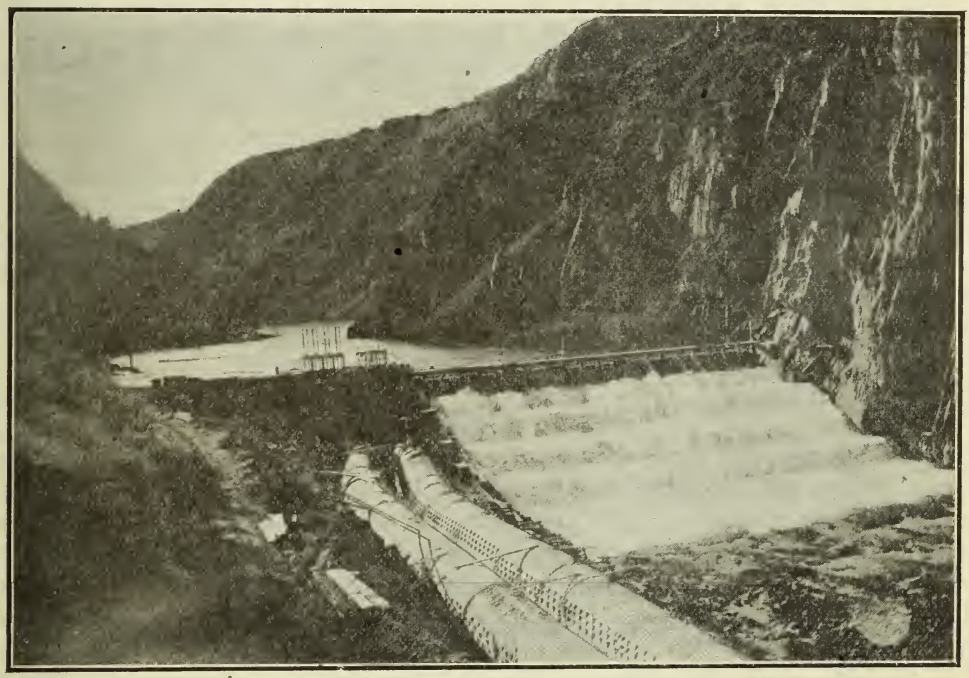
Water Power.

The development of water power is one of the most vital of our water resource questions. The hydro-electric development of our streams is one of the hopes of our future greatness in manufacturing, transportation, mining and even in irrigation. This power will prove an economical method of pumping water onto land which cannot be reached by water under a gravity

system and an economical arrangement can be had with power companies for pumping in hours when the load is minimum for other purposes.

Unlike its use for irrigation, the water of our streams when used for power purposes, returns into the stream and flows on to serve other purposes, including irrigation.

I am unable to give, what I believe to be reliable data upon this subject, at this time, and have therefore, eliminated any attempt at tabulations, except a list of such power plants as has been furnished me by the Power Companies.



Dam of Madison Power Company.

Storage Reservoir Sites.

If our water resources are to be fully utilized for either power or irrigation, too much stress cannot be laid upon the importance of conserving our flood waters, and this can only be accomplished by means of storage reservoirs.

For the purpose of securing all available data upon water storage possibilities within the state which have been either worked out or developed up to this time, I have secured and tabulated all reservoir sites which have been filed in the several U. S. Land Offices in Montana; but as there is no regulation of reservoir construction under our laws, I have no means of determining which have and which have not been actually built. However, the tabulation will show the storage possibilities, and any person interested, can investigate the particular reservoir of his choice with very little trouble;

each site being located by section, township and range in the tabulation.

I have also included in this tabulation, all unclaimed reservoir sites located by the U. S. Geological Survey, as well as the sites located for different projects of the U. S. Reclamation Service. This combined data in tabulation gives us the prospective available flood water storage in our state as ascertained up to the present time.

Evaporation.

In the "Water Resource" section will also be found a report on evaporation for the past few years, compiled especially for this report by Mr. L. F. Gieseker, Assistant Professor of the Montana Agricultural College at Bozeman, Montana, as well as a table on the same subject giving evaporation from tanks throughout the United States, which is taken from Bulletin No. 188, Bureau of Plant Industry, U. S. Department of Agriculture.

Precipitation.

A complete tabulation of precipitation from all records within our state is also given and is compiled from the U. S. Weather Bureau reports. While these figures are necessarily confined to maximum, minimum and mean data for each station, persons requiring detailed information will have to consult the Weather Bureau records in any event. The table given, however, will prove of much value for persons looking for general information upon which to base further investigation.

Stream Measurements.

In supervising the expenditure of our appropriation of $3,000.00 per year for the measurement and records of the flow of streams in this state, and with the consent of the Carey Land Act Board, under whose authority the money is expended, I have co-operated with Mr. W. A. Lamb, District Engineer of the Water Resources Branch of the U. S. Geological Survey. This gives best results and not only avoids duplication, but insures the greatest possible efficiency for money expended.

In this work, Mr. Chas. S. Heidel, Hydrographer of the State Engineer's Office, has been in active charge of the field work for the State under the direction of this office and has proven a capable and efficient assistant. He has worked directly with Mr. Lamb and his men and the most pleasant relations have existed between the Federal Service and this office, which has resulted in the maximum efficiency to both sides and the most sincere and hearty co-operation.

It is often found that when the Hydrographer of this office is in one part of the State, something arises in another part in relation to a State gauging station which requires immediate attention, which, without this cooperation, would necessitate a hurried trip across the state, resulting in a loss of both time and expense, whereas, under the present arrangement the U. S. Geological Survey Hydrographers attend to all state work in any section of the state they may be, while our Hydrographer performs

similar service for them, with the resultant saving of time and expense, and increased efficiency to both parties.

By this arrangement, we also secure full and complete copies of all records on all streams in the state on which any measurements are made by either the state or any of the departments of the Federal Service, which makes our office records as complete as it is possible to have them.

While excellent results are being obtained at this time on work now being caried out, yet only the more important streams and the streams for which there is some special reason for recording, are at the present time receiving attention, and the combined funds of all interested parties are required to maintain the records of streams now under hydrographic observation. For this reason, we have called upon the projectors of the Carey Land Act Projects in the state to pay the salaries of the various gauge observers established by the state on streams being recorded for these projects, in order that we might make our appropriation for this work go as far as possible.

As a state, we are now confronted with the fact that the lesser streams within our borders are either supplying water for irrigation and other purposes or may be expected to do so in the near future. With these present or future water appropriations will come a demand for partitioning the water, and with this demand must be recognized the necessity of a knowledge of the amount of water flowing in the stream in question in order to equitably and intelligently adjudicate the various rights. This will require measurements of the flow over a period of years; and while we are spending thousands of dollars every year to advertise our state and its resources, with a view of securing settlers, not only upon our prairies but upon our valleys, we must not lose sight of the fact that we must take care of the settler when he comes among us, if we would have him induce his friends to come. These settlers in our valleys will want irrigation. The increased area of irrigable land under cultivation will increase our taxable wealth and production and we in turn can do no less than use every reasonable effort to give him an equitable allotment of water. For this purpose we should have a knowledge of the flow of the stream from gauge measurements extending over a period of years.

We also encourage capital to invest its money with us in developing our water resources, and there again increase our taxable wealth. In order to secure the best results in this work, we must be able to show capital what water we have to conserve and develop. This also means measurements showing the flow of our undeveloped streams over a period of years.

With these facts before us, we must come to a full realization of the necessity of more thorough and complete stream measurements than are now carried on or capable of being carried on with the funds available for that purpose. We must also realize that this work must be increased from year to year and our appropriation of funds must increase as the work itself develops, until we can bring every stream under hydrographic meas-

urement which can reasonably be supposed to warrant it either in irrigation or otherwise, now or in the future.

I, therefore, recommend:

That an appropriation be made for the sum of $6,000.00 for the year of 1913, and that the sum of $7,500.00 be appropriated for the year 1914, with which to carry on the work of stream gauging in this state under state authority and direction, cooperating with the U. S. Geological Survey.

Water Rights.

Montana is one of the last states to adopt water-right laws in keeping with her development and the real necessities of her people. Under the present system all water-rights are filed with the county clerk and recorder of the county in which the water is to be diverted. Any person can file any amount that may seem advisable to him without regard to the necessities of his case or the flow of the stream. In fact many streams have single filings upon them for more than their entire flow and subsequent settlers upon the same stream usually make filing as large as those of the original locator. Again, others file upon the stream without ever attempting to take out water at all, merely attempting to establish a right by recording a location notice. It is virtually an indiscriminate scramble for water-rights without regulation or even an intelligent idea of what they really require. The result is that the county records become littered with filings of unknown value or validity. There is no way of abstracting a stream to get an intelligent idea of the water actually appropriated under these filings; and no way of ascertaining even the valid from the invalid claims and the courts are the only recourse. There is no regulation, no supervision and no protection to any one. Our present recording system is farcical, for the record is only considered prima facie evidence at best; and where no adjudication of the waters of a stream has been made, the status of a particular water-right can only be obtained by an investigation of conditions on the ground and facts relative to the appropriation and use. The result is a chaotic condition of our records and a continual fight in our courts. These conditions some begin to realize, but the seriousness of which has hardly yet begun to manifest itself. More grave questions concerning rights to water in this state will arise in the future than any which the courts have thus far been called upon to adjust. Especially is this true of streams having both agricultural and power claimants or the possibilities of such claimants in the future.

A land system which would accept a score of filings for the same quarter section of land and then leave the settlers to fight for its possession in the courts, would not be held in high esteem. A water-right law which places no restrictions on the claims to a stream is just as illogical and as fraught with needless abuses. To say the least, the present water-right records are of little or no value. They are worse. They are a makeshift which misleads and deceives everyone who relies on them. The present law was alright for what it was originally intended to accomplish, but it

has outlived its usefulness. It gave the miner and the early farmer all that he required, but in these days of progress, development and colonization, it is sadly deficient and is a continual menace. It occasions much litigation with resulting expense for court fees and lawyers, which works greatest hardships on those who can least afford it.

Wyoming began with a law similar to that of Montana. Experience showed that reform was necessary. It was not alone the fact that the record was both inaccessible and unreliable. This was bad enough, but the more serious objection was that filing did no good. There was no way to stop filing claims when the stream was exhausted. There was no way to tell what claims were followed by construction and which were not. There was no way to cancel and get rid of claims which began and ended with the filing. There was no way to protect actual users when the supply ran short. In brief, it was not a working plan. Wyoming realized this fact early in its history and was one of the very first states to correct this evil. Montana, however, with these same conditions still prevailing, clings to this old practice and her records contain a confused mess of water-right filings, good, bad and indifferent. In fact no water-right in the state can be relied upon that has not been adjudicated by the court, and even then it is always subject to a reopening and readjustment.

A radical change in our present water-right laws, placing the stream flow under the supervision and control of the state seems necessary to meet the changing conditions of our commonwealth. Such a change will not be an experiment, for laws of different kinds for the state regulation of water resources are in force in our neighboring states, some administering and regulating the use of the water in one way and some in another, but all are giving satisfaction and are improvements over the old order of things and are eminently satisfactory to the people.

With our growing population and agricultural development, public interest demands that water be put to the highest use. Court decrees giving one miner's inch or more of water is not meant to justify a waste of water because it has been decreed, but simply the beneficial use of so much of that inch as may be required. A decree does not give ownership of water, but only the right to its beneficial use. A court commissioner, appointed as water master during the irrigation season, is only a modified state supervision, so when the much coveted court decree is issued and the water distribution is regulated by a court officer, as is very often the case, the state is in reality supervising the water resources of that particular locality, and the people are protected. If, therefore, it is desirable for state supervision on one stream, why is it not equally desirable for state supervision and regulation on all streams.

It does not seem that it should be necessary to urge upon the state the importance of conserving its natural resources. It should be sufficient simply to point the way, so that the Legislature may adopt the necessary measures. It cannot be doubted that the regulation of stream flow and the general conservation of the state's water resources is and ought to be

a state function, and that ample and beneficial use of its water should be accorded everyone holding rights under the present law, but that in the use thus accorded, no one should be permitted to waste water that might be a benefit to his neighbor. For instance, the man with a decree for one miner's inch per acre, will, if he insists upon the full use of that decree and the continual flow of that amount of water, receive enough water in 150 days,—the ordinary irrigation season,—to cover his ground 7½ feet in depth in addition to the natural rainfall, and no person, who is familiar with the conditions in Montana, will claim that 7½ feet of water is necessary for successful irrigation in this state. We must assume, therefore, that if he insists upon the amount decreed him, that he has wasted water that would have benefited his neighbor and increased the taxable wealth of our state. On the contrary, if he has received his water under the supervision and regulation of a court officer, he is already under the state's supervision and police power and should not object to the benefits and protection he is receiving being made state wide.

The prime, inclusive reason for the exercise of state authority over the control of stream flow, is that under present changing and progressive conditions, this step is necessary to ensure the greatest good to the greatest number of our people; to give our commonwealth the greatest taxable wealth out of her own natural resources and to relieve the people concerned from the necessity of going into court at heavy expense to protect the rights that are already theirs. They should no more have to go into court to protect the beneficial use of water than they should to protect the use of their land.

I, therefore, recommend:

That our present water-right laws be changed to embody a system of records and regulation in harmony with the laws of our neighboring states, where the change has been so satisfactory. And under this proposed new law, water which has been or is to be appropriated for irrigation purposes, be made appurtenant to the land of its intended use.

Road Laws.

Many states have adopted a policy of state control or supervision of public highways, while others, profiting by the experience and excellent results obtained by this form of road administration, are seriously considering the enactment of similar laws. To the Engineer, the economy and efficiency of such a plan becomes at once apparent, and I recommend such a change in our laws to your serious consideration and that of the Legislature.

Respectfully submitted,

A. W. MAHON,
State Engineer.



A Montana Mountain Stream

WATER RESOURCE SECTION OF THE STATE ENGINEER'S FIFTH BIENNIAL REPORT.

Field Methods of Measuring Stream Flow.

A part of the following explanatory matter, definitions, etc., has been borrowed from the reports of the U. S. Geological Survey, but with modifications to suit conditions in Montana.

The methods used in making stream gaugings and preparing the data for publication are given in detail in U. S. G. S. Water Supply Papers No. 94 (Hydrographic Manual, U. S. Geological Survey) and No. 95 (Accuracy of Stream Measurements).

There are three distinct methods of determining the flow of open-channel streams: (1) by measurements of the slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen for any case depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

The more common type of station consists simply of a water gage, on which the height of the water is read at regular intervals, usually once or twice a day. The hydrographer makes a number of visits to the station during the season and obtains current meter measurements of the discharge at different gage heights. From these measurements a rating table is prepared, showing discharges at intermediate gage heights, and from this table the discharge for each observed gage height is obtained. The large majority of Montana gaging stations are of the type having a simple gage read daily by gage observers. In a few special cases, automatic self-recording gages have been installed.

With the exception of a few cases west of the continental divide, the streams of Montana are more or less affected by ice conditions for varying periods from November to March. As soon as ice forms along the shores of the stream immediately below the gage, it changes the relation between the gage height and the discharge, so that the open channel rating no longer applies.

Where data is required for estimates of winter flow for storage or power purposes, the gagings in winter are absolutely essential if ice conditions prevail. These winter measurements are sometimes made by cutting away sufficient ice to form an open channel and then measuring with a current meter in the ordinary manner. At other times, when the entire stream is covered with ice, holes are chopped at regular intervals across the section and soundings and velocities taken of the water flowing beneath the ice.

Explanation of Tables.

The tables showing the flow of various Montana streams have been computed from measurements made by a number of different parties. The

greater part of the work has been done by the U. S. Geological Survey. In recent years the U. S. Reclamation Service has borne the expense of a great deal of the work by paying all expenses of maintaining the numerous gaging stations required in connection with the various Reclamation Service irrigation projects. For some years, the Engineering Department of the State of Montana has cooperated with the Water Resources Branch of the U. S. Geological Survey, and for the past two and one-half years has kept one man employed constantly upon hydrography. A large part of the work done by the State has been in connection with Carey Act irrigation projects. Recently the U. S. Forest Service has been cooperating with the U. S. Geological Survey in measurements of streams within the boundaries of the National Forests. Their measurements are of value largely for determining power possibilities and limitations. A part of the records have been obtained at the expense of, and some measurements made by private individuals, power companies, and irrigation companies. Such data, when available and deemed reliable, has been included in the official reports.

For each regular gaging station are given, as far as available, such information about the locality as would enable the reader to find the station, the date it was established, the elevation of the station and of the headwaters of the stream, and the general character of the drainage area above the station. The tables consist of the monthly and yearly discharges and run-off for the years of record, and a table showing the mean monthly and mean yearly discharge for the period of record wherever there are a number of years recorded.

The various Annual Reports, Bulletins, and Water Supply Papers of the U. S. Geological Survey, have been consulted for most of the monthly and yearly discharges. The earlier records have in most cases been copied without material change. In a few instances, where the gage height was caused to rise by ice gorges, and not by an increased discharge, and where the open channel rating had been applied, these figures were corrected for such periods, or else omitted, or a footnote prepared calling attention to them. The monthly totals in acre-feet, and the mean monthly discharges have been changed, where necessary, to three significant figures, as they ought not be relied upon to a greater degree of accuracy.

Following the data for each station is given a list of the U. S. G. S. publications, in which detailed information may be found. While the 1911 reports have not as yet been published, the numbers of the Water Supply Papers, which will eventually contain this data, are given.

Following the stream flow data for the stations maintained in each drainage basin, will be found a list of miscellaneous measurements, which were not made at any of the regular gaging stations.

Definitions.

The volume of water flowing in a stream—the "run-off" or "discharge" —is expressed in various terms, each of which has become associated with

a certain class of work. These terms may be divided into two groups: (1) those which represent a rate of flow, as second-feet, miner's inch, and run-off in second-feet per square mile; and (2) those which represent an actual quantity of water as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second, and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, and at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It has been commonly used by miners and irrigators throughout the west, and is defined by statute in each state in which it is used. In Montana the miner's inch is the fortieth part of a second-foot.

"Second-feet per square mile" is applied to the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly, both as regards time and area.

"Run-off depth in inches on drainage area" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used in comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work. There is a convenient relation between the second-foot and the acre-foot. One second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, or approximately 2 acre-feet.

Table of Convenient Equivalents.

1 second-foot equals 40 Montana Statutory miner's inches.

1 second-foot equals about 1 acre-inch per hour, or enough to cover 1 acre 1 inch deep in 1 hour.

1 second-foot equals 2 acre-feet in 24 hours, nearly, or enough to cover 2 acres 1 foot deep or 1 acre 2 feet deep, nearly.

1 second-foot equals 7.48 U. S. gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons per day.

1 miner's inch equals 11.22 gallons per minute.

1 miner's inch for 30 days will cover an acre 1.49 feet deep.

1 miner's inch, for the ordinary irrigating season of 150 days, will cover an acre 7.436 feet deep.

1 miner's inch flowing from April to September inclusive (183 days), will cover an acre 9.072 feet deep.

1 gallon equals 8.36 pounds of water.

1 gallon equals 231 cubic inches.

1 acre equals 209 feet square, nearly.
1 acre equals 43,560 square feet.
1 acre-foot equals 43,560 cubic feet.
1 acre-foot equals 325,850 gallons.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 foot per second equals 0.68 mile per hour.
1 second-foot falling 8.8 feet equals 1 horsepower.
1 second-foot falling 11 feet equals 1 horsepower at 80 per cent efficiency.
1 horsepower equals 33,000 pounds falling 1 foot in 1 minute.
1 horsepower equals 550 pounds falling 1 foot in 1 second.
1 horsepower equals 746 watts.
1⅓ horsepower equals about 1 kilowatt.

River Basins in Montana.

While there are tributaries of but three main river systems in Montana, namely, the Missouri, the Columbia and the St. Mary, still so far as the State itself is concerned, these are further divided. The Yellowstone and Little Missouri rivers leave the State before flowing into the Missouri. The Clark Fork of the Columbia River and the Kootenai River are separate tributaries of the Columbia. Thus we have in Montana six distinct basins, which are the Missouri, the Yellowstone, the Little Missouri, the Clark Fork of Columbia, the Kootenai, and the St. Mary.

General Features of the Missouri River Drainage Basin.

The Missouri River is formed at Three Forks by the union of the Jefferson, Madison, and Gallatin rivers, which are therefore known as the "Three Forks of the Missouri River."

The headwaters of the stream drain a portion of the southwestern and central part of the State that has many precipitous well-forested mountains and numerous fertile irrigated valleys. Near Cascade the river leaves the mountains, and the lower portion of its course is through a more level and rolling region, with but very little timber. After flowing over the Great Falls, about 35 miles above Fort Benton, it becomes navigable.

Among the important tributaries are the Sun, Marias, Musselshell and Milk rivers. The headwaters of the first two of these streams are among the rugged forested mountains of the main range of the Rocky Mountains and the lower portions of their courses lie among fertile bench lands which irrigation projects are rapidly converting into agricultural districts. While the Musselshell River rises in the Little Belt Mountains, where there is some timber, the greater portion of its drainage area is of rolling bench lands. Practically the entire drainage basin of the Milk River consists of rolling prairies. Irrigation is extensively developed in the Milk River valley, and to a smaller extent in the basin of the Musselshell.

Ice conditions occur during the winter months, when considerable snow

falls in the mountains. The mean precipitation varies from 12 to 15 inches in the lower portions of the basin up to 30 inches or more in some of the mountainous sections.

While extensive irrigation and power developments have been undertaken, there are further opportunities for development along these lines in the Missouri basin.

In the following tables of stream flow the gaging stations in this basin and also in the other basins are listed in downstream order. After all stations from the source to the mouth of the main stream have been given, the tributaries are treated in like manner, all stations in each tributary basin being given before taking up the next one below.



Rainbow Falls of the Missouri River.

RED ROCK RIVER.

In S. W. ¼ Sec 6, T. 14 S., R. 4 W. Above Reservoir, Near Monida, Mont.

Established in 1910—See note.

Elevation of Station, about 7,000 feet.

Character of Drainage Basin: A broad valley having hay, grass and sage-brush.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
May	650	320	465	28,600
June	470	185	360	21,400
July	295	85	124	7,620
August	110	65	82.6	5,080
September	110	70	96.6	5,750
October	155	125	139	8,550
Total Recorded	....	....	.....	77,000

Note—Established for miscellaneous meaurements in 1910, when the following records were obtained: June 27, 66 sec.-ft.,; July 6, 38 sec.-ft.; July 19, 38 sec.ft., and July 30, 34 sec.-ft.

References: U. S. G. S. Water Supply Papers Nos. 286 and 306.

RED ROCK RIVER.

Below Reservoir, Near Monida, Mont.

Established in 1910—See note.

Elevation of Station, about 7,000 feet.

Drainage Area, 560 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
July, 23-31	95	88	90.8	1,620
August	105	63	78.4	4,820
September	195	69	95.8	5,700
October	450	100	207	12,700
November	280	123	179	10,700
Total Recorded	....	....	....	35,500

Note—Established for miscellaneous meaurements in 1910, when the following records were obtained: July 7, several discharges varying from 13.1 sec.-ft. to 127 sec.-ft. (while moving the gates of the dam); July 19, 65 sec.-ft., and July 30, 58 sec.-ft.

Reference: U. S. G. S. Water Supply Paper No. 306.

RED ROCK RIVER.

Observation Station Located in S. W. ¼ Sec. 3, T. 14 S., R. S. W., at Lima, Mont.
Established in 1907.
Elevation of Station, 6,260 feet.
Drainage Area, 650 square miles.
Character of Drainage Basin: High mountains, and a broad valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
August, 14–31	216	81	169	6,030
September	167	122	157	9,340
October	229	167	202	12,400
November, 1–23	204	144	176	8,030
Monthly Flow for the Year of 1908:				
November	246	107	168	10,000
December	122	80	101	6,210
Monthly Flow for the Year of 1909:				
January	90	40	60.3	3,710
February	62	44	51.6	2,870
March	107	58	75.7	4,650
April	583	107	261	15,500
May	775	190	471	29,000
June	406	28	174	10,400
July	200	79	123	7,560
August	93	56	73.8	4,540
September	160	79	122	7,260
October	180	141	161	9,900
November	170	79	128	7,620
December	108	66	93.2	5,730
Total Recorded	775	28	150	109,000
Monthly Flow for the Year of 1910:				
January	105	91	94.2	5,790
February	91	79	86.3	4,790
March	190	91	106	6,520
April	936	190	736	43,800
May	765	209	502	30,900
June	748	38	393	23,400
July	146	38	59.9	3,680
August	129	59	99.9	6,140
September	590	29	234	13,900
October	765	48	183	11,300
November	121	71	105	6,250
December	71	48	57.6	3,540
Total Recorded—a	936	29	221	160,000
Monthly Flow for the Year of 1911:				
January	18	14	16.0	984
February	131	16	33.8	1,880
March	18	14	16.6	1,020
April	191	16	40.6	2,420
May	525	250	432	26,600
June	510	213	397	23,600
July	237	54	149	9,160
August	92	54	66.0	4,060
September	160	78	110	6,550
Total Recorded	....	....	....	76,300
Mean Monthly Flow for the Period of Record:				
January	105	14	56.8	3,490
February	131	16	57.2	3,180
March	190	14	66.1	4,060
April	936	16	346	20,600
May	775	190	468	28,800
June	748	28	321	19,100
July	237	38	111	6,820
August	216	54	92.6	5,690
September	590	29	156	9,280
October	765	48	182	11,200
November	246	71	144	8,570
December	122	48	83.9	5,160
Mean Yearly	936	14	174	126,000

a—Approximately 40,000 acre feet of water were stored in the Red Rock reservoir in 1909 and released during the irrigation season of 1910.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

RED ROCK RIVER.

At Red Rock, Montana.

Established in 1890.
Elevation of Station, 5,600 feet.
Drainage Area, 1,330 square miles.
Character of Drainage Basin: Varies from high mountains to cultivated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1890:						
January	...	...	a40	.03	2,460	.03
February	...	...	a40	.03	2,220	.03
March	...	...	a40	.03	2,460	.03
April, 9–30	605	40	184	.14	10,900	.15
May	675	465	577	.43	35,500	.50
June	500	250	384	.29	22,800	.32
July	220	50	93	.07	5,720	.08
August	50	40	48	.04	2,950	.04
September	60	40	47	.03	2,800	.04
October	220	60	150	.11	9,230	.13
Total Recorded	...	...	...	...	97,000	1.35

a—Estimated.
Reference: U. S. G. S. Annual Report 11, Part 2.

BEAVERHEAD RIVER.

Observation Station Located in S. W. ¼ Sec. 20, T. 8 S., R. 9 W., at Barratts, Mont.
Established in 1907.
Elevation of Station, 5,260 feet.
Drainage Area, 2720 square miles.
Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
August, 12–31	640	389	468	18,600
September	430	322	350	20,800
October	444	342	393	24,200
November	494	404	440	26,200
December	424	296	358	22,000
Monthly Flow for the Year of 1908:				
January	350	288	309	19,000
February	300	259	277	15,900
March	524	278	345	21,200
April	909	322	637	37,900
May	2,920	398	805	49,500
June	3,640	1,710	2,610	155,000
July	1,480	550	865	53,200
August	627	487	530	32,600
September	596	432	505	30,000
October	809	568	714	43,900
November	765	468	629	37,400
December	831	412	539	33,100
Total Recorded	3,640	259	730	529,000

BEAVERHEAD RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
January	550	350	416	25,600
February	418	335	383	21,300
March	550	382	445	27,400
April	970	530	705	42,000
May	1,480	595	906	55,700
June	1,510	400	921	54,800
July	618	280	402	24,700
August	470	260	358	22,000
September	572	260	438	26,100
October	618	470	549	33,800
November	685	510	581	34,600
December	685	418	477	29,300
Total Recorded	1,510	260	548	397,000
Monthly Flow for the Year of 1910:				
January	580	351	442	27,200
February	435	360	393	21,800
March	2,010	415	934	57,400
April	1,360	688	1,150	68,400
May	1,500	580	1,070	65,800
June	550	114	304	18,100
July	235	155	202	12,400
August	267	160	220	13,500
September	505	145	268	15,900
October	530	338	378	23,200
November	555	405	452	26,900
December	455	311	361	22,200
Total Recorded	2,010	114	515	373,000
Monthly Flow for the Year of 1911:				
January	...	...	a250	15,400
February	...	...	a200	11,100
March	512	200	300	18,400
April	595	241	373	22,200
May	740	295	440	27,100
June	1,310	435	799	47,500
July	770	210	304	18,700
August	340	171	224	13,800
September	255	174	223	13,300
October	770	234	447	27,500
November	650	350	509	30,300
December	...	...	a350	21,500
Total Recorded	...	...	368	267,000
Mean Monthly Flow for the Period of Record:				
January	580	...	353	21,700
February	435	...	313	17,400
March	2,010	200	506	31,100
April	1,360	241	716	42,600
May	2,920	295	805	49,500
June	3,640	114	1,660	98,800
July	1,480	155	443	27,200
August	640	160	360	22,100
September	596	145	357	21,200
October	809	234	496	30,500
November	765	350	522	31,100
December	831	296	417	25,600
Mean Yearly	3,640	114	579	419,000

a—Estimated.

Reference for daily flow in U. S. G. S. Water Supply Papers, Nos. 246, 266, 286 and 306.

BEAVERHEAD RIVER.

At Dillon, Montana.

Elevation of Station, 5,100 feet.

Drainage Area, 3,390 square miles.

Character of Drainage Basin: Varies from high mountains to irrigated valleys.

This station was established August 28, 1907, at the highway bridge on the Bannack road, three-quarters of a mile from Dillon. It was discontinued the same year. The flow given is for only the right hand one of two channels. The other was the source of supply for a canal and was not measured.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Flow for the Month of Sept., 1907:				
September	306	284	298	17,700

The following measurement has been recorded: Sptember 9, 1889—75 second-feet.

References: U. S. G. S. Annual Reports 11, Part 2, and 13, Part 3; Water Supply Paper No. 246.

JEFFERSON RIVER.

Observation Station Located In Sec. 23, T. 2 S., R. 6 W., Near Silverstar, Montana

Established in 1910.

Elevation of Station, 4,550 feet.

Drainage Area, 7,940 square miles.

Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
August, 11-31	385	320	359	15,000
September	925	368	572	34,000
October	1,140	805	974	59,900
November	1,910	1,210	1,440	85,700
December	1,720	1,210	1,370	84,200
Monthly Flow for the Year of 1911:				
May	3,300	2,240	2,700	166,000
June	9,280	2,790	6,850	408,000
July	3,400	620	1,510	92,800
August	800	440	639	39,300
September	1,120	710	846	50,300
October	1,500	900	1,266	78,100

Reference for Daily Flow:..U. S. G. S. Water Supply Papers 286 and 306.

JEFFERSON RIVER.

Observation Station Located in T. 1 N., R. 2 E., at Sappington, Montana.
Established in 1894—(See note).
Elevation of Station, 4,200 feet.
Drainage Area, 8980 square miles.
Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1896:						
September	1,480	1,227	1,342	0.15	79,800	0.17
October	1,375	1,299	1,327	.15	81,600	.17
November	1,675	1,254	1,499	.17	89,200	.19
December	.....	.....	1,650	.18	101,000	.21
Total Recorded	.....	.....	.....	.....	352,000	.....
Monthly Flow for the Year of 1897:						
January	.....	.....	a1,500	.17	92,200	.20
February	.....	.....	a1,500	.17	83,300	.18
March	.....	.....	a1,500	.17	92,200	.20
April	.....	.....	a3,300	.37	196,000	.41
May	11,040	5,375	8,587	.96	528,000	1.10
June	7,900	2,900	4,274	.48	254,000	.54
July	4,100	1,100	2,356	.26	145,000	.30
August	1,100	550	794	.09	48,800	.10
September	860	550	758	.08	45,100	.09
October	1,225	780	1,013	.11	62,300	.12
November	.....	.....	a1,300	.14	77,400	.16
December	.....	.....	a1,400	.16	92,200	.18
Total Recorded	.....	.....	2,357	.26	1,720,000	3.58
Monthly Flow for the Year of 1898:						
January	.....	.....	a1,500	.17	92,200	.20
February	.....	.....	a1,500	.17	83,300	.18
March	2,100	1,150	1,368	.15	84,100	.17
April	6,720	1,390	3,742	.39	207,000	.44
May	10,130	3,500	5,982	.67	368,000	.77
June	9,730	5,100	8,143	.91	484,000	1.01
July	6,229	1,390	3,440	.38	212,000	.44
August	1,310	1,000	1,060	.12	65,200	.14
September	1,620	1,000	1,182	.13	70,300	.14
October	1,540	1,150	1,351	.15	83,000	.17
November	1,800	1,390	1,509	.17	89,800	.19
December	.....	.....	a1,400	.16	86,100	.18
Total Recorded	10,130	1,000	2,659	.30	1,920,000	4.03
Monthly Flow for the Year of 1899:						
April	2,645	1,870	1,992	.22	118,000	.25
May	7,645	2,020	4,915	.55	302,000	.63
June	15,470	7,445	10,933	1.22	651,000	1.36
July	11,165	2,485	6,159	.69	379,000	.80
August	2,485	1,455	2,003	.22	123,000	.25
September	1,325	1,090	1,297	.14	77,200	.16
October	2,170	1,090	1,614	.18	99,200	.21
November	2,170	1,725	1,936	.22	115,000	.25
December, 1–14	.....	.....	1,925	.21	53,500	.11
Total Recorded	.....	.....	.....	.....	1,920,000	4.02
Monthly Flow for the Year of 1900:						
March, 10–31	2,485	1,725	2,098	.23	129,000	.27
April	3,870	2,020	3,067	.34	182,000	.38
May	9,075	3,870	6,511	.72	400,000	.83
June	5,890	2,020	4,070	.45	242,000	.50
July	1,870	600	1,024	.11	63,000	.13
August	600	475	519	.06	31,900	.07
September	980	515	743	.08	44,200	.09
October	1,590	1,090	1,363	.15	83,800	.17
November	1,590	1,455	1,486	.17	88,400	.19
December	1,725	1,325	1,541	.17	94,800	.20
Total Recorded	.....	.....	.....	.....	1,360,000	2.83

MISSOURI RIVER.

Observation Station Located at Townsend, Montana.

Established in 1891—(See note).
Elevation of Station, 3830 feet.
Elevation of Head Waters, 10,000 feet.
Charater of Drainage Basin: Varies from mountains to broad irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1896:				
January—a	.....	.....	3,600	221,000
February—a	.....	.....	3,600	207,000
March—a	.....	.....	3,600	221,000
April	5,780	3,900	4,215	251,000
May	13,675	5,780	7,494	461,000
June	32,500	15,100	25,904	1,540,000
July	15,850	4,810	9,199	566,000
August	4,500	3,300	3,953	243,000
September	4,500	3,900	4,225	251,000
October	4,200	3,600	3,985	240,000
November—a	.....	.....	3,800	226,000
December—a	.....	.....	3,800	234,000
Total Recorded	32.500	3,300	6,440	4,660,000
Monthly Flow for the Year of 1897:				
January—a	.....	.....	2,800	172,000
February—a	.....	.....	2,800	156,000
March—a	.....	.....	3,000	184,000
April	11,300	4,200	6,995	416,000
May	21,300	9,700	15,811	972,000
June	19,650	7,830	11,374	677,000
July	8,180	3,300	5,345	329,000
August	3,300	2,200	2,642	162,000
September	2,820	2,200	2,611	155,000
October	3,600	3,040	3,264	201,000
November	3,600	3,300	3,410	203,000
December—a	.....	.....	3,600	221,000
Total Recorded	21,300	2,200	5,304	3,850,000
Monthly Flow for the Year of 1898:				
January—a	.....	.....	3,000	184,000
February—a	.....	.....	3,000	167,000
March	15,940	2,870	4,490	276,000
April	8,770	3,190	5,989	356,000
May	21,290	5,795	10,205	628,000
June	25,010	9,645	18,308	1,090,000
July	10,180	2,870	6,190	381,000
August	2,870	2,100	2,374	146,000
September	2,870	2,245	2,621	156,000
October	3,830	2,550	3,154	194,000
November—b	3,830	2,870	3,342	199,000
December—a	.....	.....	3,000	184,000
Total Recorded	25,010	2,100	5,472	3,960,000
Monthly Flow for the Year of 1899:				
April	8,825	2,000	5,790	344,000
May	14,300	5,400	9,687	596.000
June	52,525	13,450	29,158	1,740,000
July	31,900	5,850	14,130	869,000
August	5,850	3,750	4,866	299,000
September	3,625	3,000	3,350	199,000
October	4,950	3,000	3,864	238,000
November	4,375	3,625	4,067	242,000
December—a	.....	3,250	3,500	215,000
Total Recorded	52,525	2,000	.....	4,740,000
Monthly Flow for the Year of 1900:				
January—d	20,150	2,810	6,810	419,000
February—d	16,880	2,810	10,156	564,000
March	23,400	3,825	8,645	532,000
April	7,875	3,825	5,973	355,000
May	17,340	8,265	13,776	847,000
June	14,600	4,130	9,610	572,000
July	3,825	1,950	2,309	142,000
August	1,950	1,825	1,836	113,000
September	2,415	1,825	2,169	129,000

MISSOURI RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
October	3,025	2,600	2,897	178,000
November	9,585	3,025	3,794	226,000
December	9,585	1,825	3,697	227,000
Total Recorded	23,400	1,825	5,973	4,300,000
Monthly Flow for the Year of 1901:				
January	8,155	1,020	6,579	404,000
February	10,226	7,760	9,296	516,000
March	22,880	3,020	5,884	362,000
April	6,635	2,745	4,340	250,000
May	22,150	7,375	15,029	924,000
June	19,450	5,600	9,085	541,000
July	5,600	1,590	2,949	181,000
August	1,800	1,390	1,521	93,500
September	2,020	1,200	1,778	106,000
October	3,020	2,250	2,634	162,000
November	3,020	2,745	2,965	176,000
December—a	.....	.....	2,500	154,000
Total Recorded	22,880	1,020	5,380	3,870,000
Monthly Flow for the Year of 1903:				
March—c	14,425	4,600	10,568	650,000
April	7,760	3,950	5,295	315,000
May	10,655	5,600	7,590	467,000
June	21,445	6,635	15,785	939,000
July	7,760	3,315	5,282	325,000
August	3,630	1,800	2,398	147,000
September	2,745	1,800	2,350	140,000
October	3,315	2,745	3,231	199,000
November—a	3,315	2,745	2,934	175,000
December—a	.....	.....	2.745	169.000
Total Recorded	21,445	1,800	.....	3,530,000
Monthly Flow for the Year of 1904:				
January—a	.....	.....	2,700	166,000
February—a	.....	.....	2,700	155,000
March—c	5,260	2,490	3,947	243,000
April	13,440	3,950	7,318	435,000
May	25,410	10,655	14,672	902,000
Mean Monthly Flow for the Period of Record:				
January—d	20,150	1,020	4,250	261,000
February—d	16,880	2,800	5,260	292,000
March	23,400	2,490	5,730	352,000
April	11,300	2,000	5,740	342,000
May	25,400	5,400	11,800	726,000
June	52,520	4,130	17,000	1,010,000
July	31,900	1,590	6,490	399,000
August	5,850	1,390	2,800	172,000
September	4,500	1,200	2,730	162,000
October	4,950	2,250	3,290	202,000
November	9,585	2,745	3,480	207,000
December	9,585	1,825	3,260	200,000
Mean Yearly	52,520	1,020	5,990	4,320,000

a—Approximate.
b—Mean of 19 days taken as mean for November, 1898.
c—Mean of 17 days taken as mean for month.
d—There may have been ice conditions in January and February, 1900, so the maximum discharges for those months are questionable.

Note—Measurements of discharge before 1896 were 3,770 sec.-ft., on Nov. 18, 1894, and 10,700 sec.-ft., on June 29, 1895. Gage heights before 1896 are given in bulletins 131 and 140. Measurements in 1902 were as follows: April 14, 2,840 sec.-ft.; July 14, 6,550 sec.-ft.; and Aug. 28, 2,350 sec.-ft.

References: U. S. G. S. Bulletins, 131, 140; Annual Reports, 18 Part 4, 19 Part 4, 20 Part 4, 21 Part 4, 22 Part 4; Water Supply Papers, 11, 15, 27, 37, 49, 66, 84, 99, 75, 130.

MISSOURI RIVER.

Observation Station Located in T. 10 N., R. 1 W., at Canyon Ferry, Mont.

Established in 1889.
Elevation of Station, 3700 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 15,000 square miles.
Character of Drainage Basin: Varies from mountains to irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1889:						
September	2,040	1,693	1,873	0.12	111,000	0.15
October	2,516	2,040	2,230	.15	137,000	.18
November	2,834	2,236	2,502	.17	149,000	.20

One measurement in 1890 gave the following result: Sept. 18, discharge 2,680 second-feet.

References: U. S. G. S. Annual Reports 11 Part 2,, 13 Part 3.

MISSOURI RIVER.

Observation Station Located in T. 15 N., R. 3 W., at Craig, Mont.

Established in 1890.
Elevation of Station, 3,450 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 17,600 square miles.
Character of Drainage Basin: Varies from mountains to irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1890:						
January	.....	.....	a3,000	0.17	184,000	0.20
February	.....	.....	a3,000	.17	166,000	.18
March	.....	.....	a3,000	.17	184,000	.20
April	6,190	3,595	4,662	.26	277,000	.29
May	12,500	6,900	10,472	.59	644,000	.68
June	11,900	8,100	10,074	.57	599,000	.64
July	7,800	2,614	5,020	.28	309,000	.33
August	2,505	1,960	2,216	.13	136,000	.15
September	2,396	1,960	2,232	.13	133,000	.14
October	2,722	1,742	2,379	.13	146,000	.16
November	3,159	2,723	2,868	.16	171,000	.18
December	3,159	1,742	2,763	.16	170,000	.18
Total Recorded	12,500	1,742	4,307	.24	3,120,000	3.23
Monthly Flow for the Year of 1891:						
January	3,823	1,742	2,967	0.17	182,000	0.19
February	.....	.....	a3,500	.20	215,000	.24
March	.....	.....	a4,000	.23	246,000	.26
April	9,130	4,576	5,794	.32	345,000	.37
May	12,050	7,150	9,015	.51	554,000	.59
June	16,355	11,000	13,645	.77	812,000	.85
July	12,960	5,890	9,115	.52	561,000	.60
August	5,890	2,832	4,415	.25	272,000	.29
September	3,704	2,614	3,078	.17	183,000	.19
October	3,704	3,159	3,511	.20	216,000	.23
November	4,358	3,486	3,802	.22	226,000	.25
December	.....	.....	a3,200	.18	197,000	.21
Total Recorded	16,355	1,742	5,503	.31	4,010,000	4.27

MISSOURI RIVER—(Continued).

Month.	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1892:						
January	.....	.....	a3,000	.17	184,000	0.20
February	.....	.....	a3,000	.17	172,000	.18
March	.....	.....	a3,200	.18	197,000	.21
April	4,140	3,268	3,552	.20	211,000	.23
May	18,550	3,486	8,004	.45	492,000	.52
June, 1–25	28,650	13,270	21,027	1.19	1,251,000	1.34
Total Recorded	.....	.....	.....	.....	2,510,000	.....
Mean Monthly Flow for the Period of Record:						
January	.....	.....	2,990	.17	184,000	.20
February	.....	.....	3,170	.18	176,000	.19
March	.....	.....	3,400	.19	209,000	.22
April	9,130	3,268	4,670	.27	278,000	.30
May	18,550	3,486	9,160	.52	562,000	.60
June	28,650	8,100	14,900	.85	887,000	.95
July	12,960	2,614	7,070	.40	435,000	.46
August	5,890	1,960	3,320	.19	204,000	.22
September	3,704	1,960	2,660	.15	158,000	.17
October	3,704	1,742	2,940	.17	181,000	.20
November	4,358	2,723	3,340	.19	199,000	.21
December	.....	.....	2,980	.17	183,000	.20
Mean Yearly	28,650	1,742	5,050	.29	3,657,000	3.92

a—Estimated.

References: U. S. G. S., Annual Reports Nos. 11 Part 2, 12 Part 2, 13 Part 3, and 14 Part 2.

MISSOURI RIVER.

Observation Station Located in Sec. 35, T. 18 N., R. 1 W., at Cascade, Mont.

Established in 1902.

Elevation of Station 3,380 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 18,300 square miles.

Character of Drainage Basin: Varies from mountains to irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
July, 17–31	6,900	3,170	4,847	0.265	144,000	0.148
August	2,950	1,810	2,171	.119	134,000	.137
September	2,305	1,915	2,057	.112	122,000	.125
October	2,950	2,380	2,720	.149	167,000	.172
November	4,030	2,550	3,176	.174	189,000	.194
Monthly Flow for the Year of 1903:						
January	.....	.....	a3,000	.164	184,000	.189
February	.....	.....	a3,000	.164	167,000	.171
March	.....	.....	a5,000	.273	307,000	.315
April	9,300	4,730	6,536	.357	389,000	.398
May	12,700	7,700	9,958	.544	612,000	.624
June	22,700	12,100	17,953	.981	1,070,000	1.091
July	12,700	2,845	7,302	.399	449,000	.460
August	3,420	2,090	2,372	.130	146,000	.150
September	2,550	1,970	2,274	.124	135,000	.138
October	3,170	2,645	3,056	.167	188,000	.193
November	6,300	3,170	4,470	.244	266,000	.272
December	9,900	2,740	6,083	.332	374,000	.383
Total Recorded	.....	.....	5,917	.323	4,290,000	4.384

MISSOURI RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
January	.....	.....	a6,000	.328	369,000	.378
February	.....	.....	a6,000	.328	345,000	.354
March	.....	.....	a6,000	.328	369,000	.378
April	12,830	5,150	8,409	.460	500,000	.513
May	21,710	12,090	14,925	.816	918,000	.941
June	20,600	11,350	16,660	.911	991,000	1.016
July	11,550	3,600	7,436	.406	457,000	.468
August	3,480	2,305	2,898	.158	178,000	.182
September	2,380	1,915	2,167	.118	129,000	.132
October	3,600	2,465	2,979	.163	183,000	.188
November	3,600	3,260	3,416	.187	203,000	.209
December	4,490	2,740	3,597	.197	221,000	.227
Total Recorded	.....	.....	6,707	.367	4,860.000	4.986
Monthly Flow for the Year of 1905:						
January	.....	.....	a3,000	.164	184,000	.189
February	.....	.....	a3,000	.164	167,000	.171
March	3,930	3,340	3,721	.203	229,000	.234
April	4,320	3,120	3,635	.199	216,000	.222
May	4,320	3,450	3,944	.216	242,000	.249
June	10,410	4,060	8,081	.442	481,000	.493
July	10,070	2,600	4,518	.247	278,000	.285
August	2,900	1,800	2,147	.117	132,000	.135
September	2,020	1,720	1,929	.105	115,000	.117
October	2,600	1,720	2,159	.118	133,000	.136
November	3,930	2,600	3,158	.173	188,000	.193
December	.....	.....	a3,000	.164	184,000	.189
Total Recorded	.....	.....	3,524	.192	2,550,000	2.613
Monthly Flow for the Year of 1906:						
January	4,990	3,340	4,170	.228	256,000	.26
February	5,800	2,500	3,480	.190	193,000	.20
March—b	5,200	3,340	3,840	.210	236,000	.24
April	6,550	4,060	5,220	.285	311,000	.32
May	14,900	6,400	8,990	.491	553,000	.57
June	17,000	6,320	13,000	.710	774,000	.79
July	7,000	2,700	4,660	.255	287,000	.29
August	2,520	1,950	2,140	.117	132,000	.13
September	3,720	2,290	2,970	.162	177,000	.18
October	2,940	2,840	2,880	.157	177,000	.18
November	....	2,940	a2,900	.158	173,000	.18
December	.....	.....	a3,000	.164	184,000	.19
Total Recorded	.....	.....	4,770	.216	3,450,000	3.53
Monthly Flow for the Year of 1907:						
January	.....	.....	a4,000	.218	246,000	.25
February	.....	.....	a4,000	.218	222,000	.23
March	7,950	4,930	6,040	.330	371,000	.38
April	10,400	5,440	7,320	.400	436,000	.45
May	17,400	6,100	10,700	.585	658,000	.67
June	36,000	14,900	22,200	1.21	1,320,000	1.35
July	28,700	10,800	18,700	1.02	1,150,000	1.18
August	11,600	2,910	6,010	.328	370,000	.38
September	5,210	4,110	4,320	.236	257,000	.26
October	7,360	2,350	4,580	.250	282,000	.29
November	5,800	2,350	3,910	.214	233,000	.24
December	.....	.....	a3,500	.191	215,000	.22
Total Recorded	.....	.....	7,930	.434	5,760,000	5.90
Monthly Flow for the Year of 1908:						
January	.....	.....	a3,000	.164	184,000	.19
February	.....	.....	a3,000	.164	173,000	.18
March	.....	.....	a4,000	.218	246,000	.25
April	31,100	3,240	6,530	.357	389,000	.40
May	19,800	5,630	9,090	.497	559,000	.57
June	49,300	25,200	36,700	2.01	2,180,000	2.24
July	24,690	5,480	12,800	.699	787,000	.84
August	5,200	2,780	3,810	.208	234,000	.24

MISSOURI RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	5,340	3,230	4,050	.221	241,000	.25
October	8,170	4,640	6,320	.345	389,000	.40
November	6,530	5,050	5,850	.320	348,000	.36
December	.....	.....	a4,000	.218	246,000	.19
Total Recorded	.....	.....	8,260	.452	5,980,000	6.11
Monthly Flow for the Year of 1909:						
January	....	.....	a3,000	.164	184,000	.19
February	.....	.....	a4,000	.218	222,000	.23
March—c	5,930	4,770	5,480	.299	337,000	.34
April	7,170	5,340	6,000	.328	357,000	.37
May	24,300	7,170	11,900	.650	732,000	.75
June	38,700	15,200	25,100	1.37	1,490,000	1.53
July	17,200	3,970	8,610	.470	529,000	.54
August	6,530	2,890	4,040	.221	248,000	.25
September	7,500	2,780	5,370	.293	320,000	.33
October	5,930	4,910	5,340	.292	328,000	.34
November	5,630	3,230	4,580	.250	273,000	.28
December	.....	.....	a,3000	.164	184,000	.19
Total Recorded	.....	.....	7,220	.394	5,200,000	5.34
Monthly Flow for the Year of 1910:						
January	.....	.....	a3,400	.186	209,000	.21
February	.....	.....	a3,450	.188	192,000	.20
March	.....	.....	a9,480	.518	583,000	.60
April	15,800	9,790	11,500	.628	684,000	.70
May	19,700	12,400	15,900	.869	978,000	1.00
June	16,000	3,600	8,840	.483	526,000	.54
July	3,600	2,160	2,840	.155	175,000	.18
August	2,160	1,520	1,800	.098	111,000	.11
September	4,440	1,720	3,010	.164	179,000	.18
October	5,350	3,340	3,800	.208	234,000	.24
November	5,350	3,600	4,730	.258	281,000	.29
December	5,350	3,740	4,700	.257	289,000	.30
Total Recorded	19,700	.....	6,120	.334	4,440,000	4.55
Monthly Flow for the Year of 1911:						
January	.....	.....	a3,200	.175	197,000	.20
February	.....	.....	a3,700	.202	205,000	.21
March	.....	.....	d5,670	.310	349,000	.36
April	7,400	5,270	6,500	.355	387,000	.40
May	12,800	e 965	8,080	.442	497,000	.51
June	27,200	12,000	20,700	1.13	1,230,000	1.26
July	12,000	2,300	6,150	.336	378,000	.39
August	4,150	2,160	3,140	.172	193,000	.20
September	3,890	2,160	3,020	.165	180,000	.18
October	4,650	3,760	4,370	.239	269,000	.28
November	4,650	3,870	4,200	.230	250,000	.26
December	4,930	2,400	3,400	.186	209,000	.21
Total Recorded	27,200	965	6,000	.328	4,344,000	4.46
Mean Monthly Flow for the Period of Record:						
January	.....	.....	3,640	.199	224,000	.23
February	.....	.....	3,740	.204	208,000	.21
March	.....	.....	5,430	.297	334,000	.34
April	31,100	3,120	6,850	.374	408,000	.42
May	24,300	965	10,400	.568	640,000	.66
June	49,300	3,600	18,800	1.03	1,120,000	1.15
July	28,700	2,160	7,940	.434	488,000	.50
August	11,600	1,520	3,050	.167	188,000	.19
September	7,500	1,720	3,120	.170	186,000	.19
October	8,170	1,720	3,820	.209	235,000	.24
November	6,530	2,350	4,040	.221	240,000	.25
December	9,900	.....	3,810	.208	234,000	.24
Mean Yearly	49,300	e 965	6,220	.340	4,500,000	4.62

a—Estimated.
b—Mean for 17 days taken as mean for the month.
c—Mean for 20 days taken as mean for the month.
d—March 1-17, 1911, estimated.
e—Minimum discharge caused by filling dam above gage.
References for daily flow in U. S. G. S. Water Supply Papers, Nos. 84, 99, 130, 172, 208, 246, 266, 286 and 306.

MISSOURI RIVER AT RAINBOW DAM.

Observation Station Located near Great Falls, Montana.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
August	3,250	2,100	2,660	164,000
September	5,200	2,450	3,950	235,000
October	6,200	3,430	4,870	299,000
November	5,000	2,940	4,640	276,000
December	4,640	2,300	3,340	205,000
Monthly Flow for the Year of 1911:				
January	4,000	2,150	2,950	181,000
February	5,100	3,120	3,960	220,000
April	9,200	5,900	7,500	446,000
May	14,500	5,300	11,000	676,000

Note—The above discharges are obtained from hydrographs furnished by the Butte Electric & Power Co.

MISSOURI RIVER AT FORT BENTON.

Established in 1881—(See note).
Elevation of Station, 2,500 feet.
Drainage Area 24,600 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
August, 17-31	3,110	2,520	2,740	81,500
September	5,400	2,780	4,250	253,000
October	6,380	3,830	5,220	321,000
November	.....	.....	a 5,460	325,000
December	5,710	3,210	4,680	288,000

a—Discharge interpolated Nov. 11-Dec. 1.

Measurements in other years have been reported as follows:

August 12, 1872	11,100	second feet.
May 26, 1897	28,700	second feet.
April 10, 1911	7,240	second feet.
April 10, 1911	7,170	second feet.
May 31, 1911	15,000	second feet.
July 9, 1911	13,100	second feet.
July 25, 1911	4,130	second feet.
August 30, 1911	3,680	second feet.

Note—Gage heights were taken by the U. S. Army from 1881 to 1891, and by the U. S. Weather Bureau since July 1, 1902; but sufficient discharge measurements to form a rating were not obtained until 1910. For the early gage heights see the annual reports of the chief engineer of the U. S. Army from 1881 to 1891, and the reports of the U. S. Weather Bureau from 1902 to date.

References: U. S. G. S. Annual Reports 19 Part 4, 20 Part 4, and Water Supply papers Nos. 236 and 306.

BIG HOLE RIVER.

Observation Station Located in Sec. 36, T. 1 N., R. 11 W., 4 Miles Above Dewey, Mont.

Established in 1910.
Elevation of Station, 6,000 feet.
Drainage Area, 2190 square miles.
Character of Drainage Basin: Mountains and agricultural valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
Monthly Flow for the Year of 1910:				
September, 15–31	337	187	271	9,140
October	542	304	393	24,200
November	524	430	500	29,800
December	478	.....	a367	22,600
Monthly Flow for the Year of 1911:				
January—b	.....	.....	300	18,400
February—b	.....	.....	250	13,900
March	655	250	343	21,100
April	2,000	680	1,160	69,000
May	2,600	1,360	1,870	115,000
June	10,400	1,900	6,590	392,000
July	4,560	755	1,640	101,000
August	870	265	551	33,900
Septemoer	350	250	276	16,400
October	605	280	488	30,000
November	430	280	365	21,700
December	315	225	245	15,100
Total Recorded	10,400	.....	1,170	848,000

a—Estimated by comparison with stations on the Beaverhead and Jefferson Rivers for Dec. 11–31, 1910.
b—Estimated.
Reference for daily flow in U .S. G. S. Water Supply Papers Nos. 286 and 306.

RUBY RIVER.

Observation Station Located Eight Miles Above Alder, Montana.

Established in 1911.
Elevation of Station, 5,400 feet.
Drainage Area, 540 square miles.
Character of Drainage Basin: Source in the mountains; irrigated meadows near the station.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
Monthly Flow for the Year of 1911:				
May	652	141	373	22,900
June	320	340	630	37,500
July	340	141	189	11,600
August	219	95	147	9,040
September	141	76	114	6,780
October	166	117	139	8,550
November	141	117	134	7,970
December—a	.....	.....	100	6,150
Total Recorded	.....	.....	.....	110,000

a—Estimated.
Reference for daily flow in U. S. G. S. Water Supply Paper 306.
Data compiled from U. S. Irrigation Investigations, Water Rights decreed on stream: 13,146 inches in 1891. Much of this has been abandoned; 1,859 inches for 2,434 acres in 1911.

PIPESTONE CREEK.

Observation Station Located in S. W. ¼ Sec. 36, T. 2 N., R. 5 W., near Whitehall, Mont.

Established in 1910.
Elevation of Station, 4,500 feet.
Elevation of Head Waters, 7,500 feet
Character of Drainage Basin: A small mountain basin.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
Monthly Flow for the Year of 1910:				
October, 13–31	3.5	2.5	3.03	114
November	15.0	2.5	8.28	493
December	1.60	10.0	12.5	769
Monthly Flow for the Year of 1911:				
January—a	.....	.....	10.0	615
February—a	.....	.....	12.0	666
March	23.	10.	14.2	873
April	49.	15.	21.6	1,290
May	49.	29.	39.5	2,430
June	87.	27.	53.8	3,200
July	33.	1.5	6.23	383
August	8.0	.5	2.24	138
September	1.5	.5	1.40	83
Total Recorded	.....	.....	.....	9,680

a—Estimated.

Reference for daily flow: U. S. G. S. Water Supply Papers Nos. 286 and 306.

WHITETAIL CREEK.

Observation Station Located at Highway Bridge, Near Whitehall, Montana.

Established in 1911.
Elevation of Station, 4,450 feet.
Elevation of Head Waters, 7,500 feet.
Character of Drainage Basin: A small irrigated basin.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
March, 19–31	20	14	17.1	440
April	125	16	41.6	2,480
May	72	14	34.6	2,130
June	96	10	32.2	1,920
Total Recorded	.....	.....	.....	6,970

Reference for daily flow: U. S. G. S. Water Supply Paper 306.

LITTLE WHITETAIL.

Observation Station Located at Collins' Ranch, Near Whitehall, Montana.

Established in 1911.
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 7,500 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
March	3.7	3.3	5.54	341
April	12.0	4.8	6.65	396
May	6.8	.6	3.15	194
June	12.0	.6	4.96	295
July	1.5	.6	1.24	76.2
August	4.7	1.5	2.67	164
September	2.9	.6	1.89	112
Total Recorded	.....	.....	.....	1,580

Reference for daily flow U. S. G. S. Water Supply paper 306.

MADISON RIVER.

Near Norris, Montana.

This station is at the highway bridge about five miles east of Norris. The older reports call the station "Madison River near Red Bluff."

Established in 1890—(See note).
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 11,000 feet.
Drainage Area 2,085 square miles.
Character of Drainage Basin: Timbered mountains and irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1890:						
January—a	.....	.....	1,200	0.58	73,800	0.66
February—a	.....	.....	1,200	.58	66,600	.60
March—a	.....	.....	1,200	.58	73,800	.66
April	2,580	1,370	1,620	.78	96,400	.87
May	6,420	3,060	4,823	2.32	297,000	2.67
June	6,360	3,780	4,977	2.38	296,000	2.66
July	3,660	1,715	2,518	1.21	155,000	1.39
August	1,640	1,375	1,535	.74	94,500	.85
September	1,580	1,420	1,466	.70	87,200	.78
October	1,520	1,420	1,498	.72	92,100	.83
November	1,470	1,285	1,380	.66	82,100	.74
December	1,520	1,285	1,400	.67	86,100	.77
Total Recorded	6,420	1,285	2,068	.99	1,500,000	13.48
Monthly Flow for the Year of 1891:						
January	1,580	1,249	1,406	.67	86,500	.78
February	1,580	1,265	1,436	.69	79,700	.72
March	1,790	1,470	1,631	.78	100,000	.90
April	1,960	1,640	1,774	.85	106,000	.95
May	4,260	1,790	3,389	1,62	208,000	1.88
June	4,620	3,788	4,167	2.00	248,000	2.20
July	3,660	1,155	2,045	.98	126,000	1.13
August	1,640	1,200	1,429	.68	87,900	.80
September	1,375	1,240	1,309	.63	77,900	.70
October	1,470	1,240	1,351	.65	83,100	.75
November	1,470	1,285	1,400	.67	83,300	.75
December	1,240	1,070	1,137	.55	69,900	.63
Total Recorded	4,620	1,070	1,872	.90	1,400,000	12.19

MADISON RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1892:						
January	1,375	1,240	1,305	.63	80,300	.72
February	1,640	1,330	1,504	.72	86,500	.78
March	1,640	1,320	1,488	.71	91,500	.82
April	1,420	1,240	1,295	.62	77,000	.69
May	2,580	1,330	1,454	.70	89,400	.81
June	5,940	2,820	4,900	2.35	292,000	2.62
July	5,340	1,790	3,225	1.55	198,000	1.78
August	1,885	1,285	1,519	.73	93,400	.84
September	1,420	1,330	1,360	.65	80,900	.73
October	1,420	1,285	1,327	.64	81,600	.74
November	1,420	1,330	1,424	.68	84,700	.76
December	1,420	1,240	1,324	.64	81,400	.73
Total Recorded	5,940	1,240	1,844	.89	1,340,000	12.02
Monthly Flow for the Year of 1893:						
January	1,375	1,155	1,229	.59	75,600	.68
February	1,960	1,030	1,287	.62	71,400	.64
March	1,200	1,030	1,082	.52	66,500	.60
April	1,240	910	1,019	.49	60,600	.55
May	1,520	1,070	1,326	.64	81,600	.74
June	3,180	1,580	2,421	1.16	144,000	1.20
Total Record	.....	.....	.....	.....	500,000	.....
Monthly Flow for the Year of 1910:						
August, 12–31	1,750	850	1,310	.....	52,000	.....
September	1,750	1,050	1,360	.....	80,900	.....
October	2,020	1,270	1,560	.....	95,900	.....
November, 1–20	2,300	1,050	1,430	.....	56,700	.....
Total Recorded	.....	.....	.....	.....	286,000	.....
Mean Monthly Flow for the Period of Record:						
January	1,580	1,160	1,280	0.61	78,700	0.70
February	1,960	1,030	1,360	.65	75,500	.68
March	1,790	1,030	1,350	.65	83,000	.75
April	2,580	910	1,430	.69	85,100	.77
May	6,420	1,070	2,750	1.32	169,000	1.52
June	6,360	1,580	4,120	1.98	245,000	2.21
July	5,340	1,160	2,600	1.25	160,000	1.44
August	1,880	850	1,450	.70	89,200	.81
September	1,750	1,050	1,370	.66	81,500	.74
October	2,020	1,240	1,430	.68	87,900	.78
November	2,300	1,050	1,410	.68	83,900	.76
December	.....	1,070	1,290	.62	79,300	.72
Mean Yearly	6,420	850	1,820	0.87	1,320,000	11.88

a—Estimated.

Reference for daily flow in U. S. G. S. Annual Reports 11 Part 2, 12 Part 2, 13 Part 3 and 14 Part 2; Bulletin 131, and Water Supply Paper 286.

Note—The station was discontinued in Nov. 1894 re-established in Aug. 1910, and discontinued in Nov. 1910. Gage heights are published for the latter part of 1893 as well as 1894, but a rating was not obtained for that period. One discharge measurement gave 1,190 second-feet on Aug. 23, 1893.

MADISON RIVER

Below Mouth of Cherry Creek, Near Norris, Montana.

This station was about one and one-half miles below the mouth of Cherry Creek, twelve miles north of Norris, and 25 miles west of Bozeman.

Established in 1897.

Elevation of Station, 4,500 feet.

Elevation of Head Waters, 11,000 feet

Drainage Area, 2,250 square miles.

Character of Drainage Basin: Timbered mountains and irrigated valley.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1897:						
January—a	.....	.....	1,600	0.71	98,400	0.82
February—a	.....	.....	1,600	.71	88,900	.74
March—a	.....	.....	1,600	0.71	98,400	.82
April—a	.....	.....	1,900	.84	113,000	.94
May 2-17, 27-31b	8,613	3,300	4,928	2.19	205,000	2.52
June	8,613	2,700	4,430	1.97	264,000	2.20
July	3,000	2,000	2,553	1.13	157,000	1.30
August	2,000	1,600	1,681	.75	103,000	.86
September	1,600	1,525	1,544	.69	91,900	.77
October	1,800	1,450	1,634	.73	100,000	.84
November—a	.....	.....	1,700	.76	101,000	.85
December—a	.....	.....	1,700	.76	104,000	.88
Total Recorded	.....	.....	2,240	1.00	1,520,000	12.54
Monthly Flow for the Year 1898:						
May—a	.....	.....	4,834	2.15	297,000	2.48
June	8,000	3,450	6,001	2.67	357,000	2.98
July	4,425	2,800	3,623	1.61	223,000	1.86
August	3,125	2,150	2,679	1.19	165,000	1.37
September	2,800	2,150	2,258	1.00	134,000	1.12
October	2,312	2,150	2,160	.96	133,000	1.11
November—a	.. ...	.....	2,150	.96	128,000	1.07
Total Recorded	.....	.....	.....	.....	1,440,000	.....
Monthly Flow for the Year of 1899:						
April—a	.....	.....	2,843	1.26	169,000	1.41
May	6,050	1,175	3,051	1.36	188,000	1.57
June	10,275	6,050	8,385	3.72	499,000	4.15
July	8,650	2,800	5,159	2.29	317,000	2.64
August	3,612	2,150	2,727	1.21	168,000	1.40
September	2,150	2,150	2,150	.96	128,000	1.07
October	1,825	1,825	1,825	.81	112,000	.93
November—a	... ..	.....	1,825	.81	109,000	.90
Total Recorded	.....	.....	.....	.....	1,690,000	.....
Monthly Flow for the Year of 1900:						
March—a	.....	.....	860	.38	52,900	0.44
April	2,530	860	1,764	.78	105,000	.87
May	5,655	3,005	4,259	1.89	262,000	2.18
June	5,380	2,075	3,602	1.60	214,000	1.78
July	2,075	1,640	1,855	.82	114,000	.95
August	1,850	1,640	1,667	.74	102,000	.85
September	1,850	1,640	1,689	.75	100,000	.84
October	1,850	1,850	1,850	.82	114,000	.95
November	1,850	1,640	1,661	.74	98,800	.83
December	1,640	1,640	1,640	.73	101,000	.84
Total Recorded	.....	.....	.....	.....	1,260,000	.....
Monthly Flow for the Year of 1901:						
January	.....	.....	a1,106	0.49	68,000	0.56
February	.....	.....	a1,106	.49	61,400	.51
March	.....	.....	a1,106	.49	68,000	.56
April	.2,275	1,900	1,958	.87	116,000	.97
May	8,325	2,825	5,085	2.26	313,000	2.61
June	5,400	2,400	3,357	1.49	200,000	1.66
July	2,400	1,650	2,013	.90	124,000	1.04
August	1,900	1,475	1,560	.69	95,900	.80

MADISON RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	1,475	1,475	1,475	.66	87,800	.74
October	1,475	1,475	1,475	.66	90,700	.76
November	1,650	1,475	1,516	.67	90,200	.75
December	.....	.....	a1,475	.66	90,700	.76
Total Recorded	.....	.....	1,936	.86	1,410,000	11.72
Monthly Flow for the Year of 1902:						
March, 23-31	.....	.....	910	.40	16,200	0.46
April	2,075	910	1,436	.64	85,400	.71
May	6,140	1,570	3,001	1.33	184,000	1.53
June	6,440	2,880	4,336	1.93	258,000	2.15
July	3,450	1,570	2,435	1.08	150,000	1.24
August	1,570	1,175	1,361	.60	83,700	.69
September	1,360	1,360	1,360	.60	80,900	.67
October	1,360	1,360	1,360	.60	83,600	.69
November, 1-8	.....	.....	1,360	.60	21,600	.67
Total Recorded	.....	.....	.....	.....	963,000	.....
Monthly Flow for the Year of 1903:						
January—a	.....	.....	1,300	0.58	79,900	0.67
February—a	.....	.....	1,300	.58	72,200	.60
March—a	.....	.....	1,300	.58	79,900	.67
April	1,700	1,440	1,622	.72	96,500	.80
May	3,355	1,700	2,281	1.01	140,000	1.16
June	6,145	3,510	5,065	2.25	301,000	2.51
July	3,510	1,700	2,141	.95	132,000	1.10
August	1,440	1,050	1,258	.56	77,400	.65
September	1,220	1,050	1,095	.49	65,200	.55
October	1,220	1,050	1,209	.54	74,300	.62
November	1,220	1,220	1,220	.54	72,600	.60
December—a	.....	.....	1,200	.53	73,800	.61
Total Recorded	.....	.....	1,749	.78	1,260,000	10.54
Monthly Flow for the Year of 1904:						
January—a	.....	.....	1,200	0.53	73,800	.61
February—a	.....	.....	1,200	.53	69,000	.57
March—c	1,755	1,100	1,288	.57	79,300	.66
April	2,010	1,100	1,433	.64	85,300	.71
May	6,735	2,010	3,745	1.66	230,000	1.91
June	6,735	3,855	5,610	2.49	334,000	2.78
July	3,855	1,755	2,667	1.18	164,000	1.36
August	1,755	1,410	1,532	.68	94,200	.78
September	1,520	1,300	1,355	.60	80,600	.67
October	1,410	1,300	1,346	.60	82,800	.69
November	1,300	1,300	1,300	.58	77,400	.65
December—a	.....	.....	1,200	.53	73,800	.61
Total Recorded	.....	.....	1,990	.88	1,440,000	12.00
Monthly Flow for the Year of 1905:						
March, 12-21	1,540	1,320	1,463	0.65	58,000	0.75
April	1,549	1,540	1,540	.68	91,600	.76
May	2,125	900	1,570	.70	96,500	.81
June	3,974	2,000	3,195	1.42	190,000	1.58
July	3,000	800	1,844	.82	113,000	.95
August	1,320	1,100	1,177	.52	72,400	.60
September	1,210	1,100	1,171	.52	69,700	.58
October	1,100	1,100	1,100	.49	67,600	.56
November—c	1,100	1,100	1,100	.49	65,500	.55
Total Recorded	.....	.....	.....	.....	824,000	.....
Mean Monthly Flow for the Period of Record:						
January	.....	.....	1,300	0.58	79,900	0.67
February	.....	.....	1,300	.58	72,200	.60
March	.....	.....	1,220	.54	75,000	.62
April	2,530	860	1,810	.80	108,000	.89
May	b	900	3,640	1.62	224,000	1.87
June	10,300	2,000	4,890	2.17	291,000	2.42
July	8,650	800	2,700	1.20	166,000	1.38
August	3,610	1,050	1,740	.77	107,000	.89

MADISON RIVER—(Continued).

Month.	Discharge in Second-feet				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches Drainage Area
September	2,800	1,050	1,570	.70	93,400	.78
October	2,310	1,050	1,550	.69	95,300	.80
November	1,850	1,100	1,540	.68	91,600	.76
December	.....	....	1,440	.64	88,500	.74
Mean Yearly	.....	.....	2,060	.92	1,490,000	12.42

a—Estimated.
b—Water above top of gage, May 18–26, 1897.
c—Mean for 26 days used as mean for the month.
Reference for daily flow in U. S. G. S. Annual Reports 19 Part 4, 20 Part 4, 21 Part 4, 22 Part 4, and in Water Supply Papers Nos. 15, 27, 37, 39, 49, 52, 66, 75, 84, 99, 130 and 172.

MADISON RIVER.

Observation Station Located at Three Forks, Montana.

Established in 1893—(See note).
Elevation of Station, 4,060 feet.
Elevation of Head Waters, 11,000 feet.
Drainage Area, 2,420 square miles.
Character of Drainage Basin: Timbered mountains and irrigated valley.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1895:						
January—a	.....	.....	2,310	0.95	142,000	1.09
February—a	.....	.....	2,310	.95	128,000	.99
March—a	.....	.....	2,310	0.95	142,000	1.09
April	2,880	1,980	2,214	.92	132,000	1.02
May	3,880	2,880	3,166	1.30	195,000	1.50
June	3,480	2,680	3,163	1.30	188,000	1.45
July	2,680	1,440	1,882	.78	116,000	.90
August—a	.....	.....	1,440	.60	88,500	.69
September—a	.....	.....	1,440	.60	85,700	.67
October—a	.....	.....	1,541	.64	94,700	.78
November—a	.....	.....	1,500	.62	89,300	.69
December—a	.....	.....	1,500	.62	92,200	.72
Total Recorded	3,880	1,440	2,065	.85	1,490,000	11.59
Monthly Flow for the Year of 1896:						
January—a	.....	.....	1,500	.62	92,200	.72
February—a	.....	.....	1,500	.62	86,300	.67
March—a	.....	.....	1,600	.66	98,400	.76
April	1,980	1,690	1,878	.75	108,000	.83
May	3,680	1,830	2,222	.92	137,000	1.06
June	8,175	4,425	6,363	2.63	379,000	2.93
July	4,725	1,690	2,723	1.12	167,000	1.29
August	1,815	1,385	1,513	.62	92,800	.71
September	1,525	1,427	1,469	.61	87,400	.68
October	1,475	1,385	1,432	.59	87,900	.68
November—a	.....	.....	1,400	.58	83,300	.64
December—a	.....	.....	1,400	.58	86,100	.67
Total Recorded	8,175	1,385	2,078	0.86	1,500,000	11.64

a—Approximate.
Note—Although the station was established in 1893 and a few gage heights published for 1893–4, a rating was not obtained until 1895. Measurements prior to 1895 have been reported as follows: Oct. 14, 1889, discharge 1,190 sec.-ft.; Aug. 24, 1893, discharge 1,250 sec.-ft., and Nov. 4, 1895, discharge 1,490 sec.-ft.
Reference for daily flow in U. S. G. S. Annual Reports 11 Part 2, 13 Part 3, 18 Part 4, and 20 Part 4; Bulletins 131 and 140, Water Supply Papers 11 and 15.

WEST GALLATIN RIVER.

Observation Station Located at Mouth of Spanish Creek Near Salesville, Mont.

Established in 1889.
Elevation of Station, 5,300 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 850 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1889:						
August—b	437	402	426	0.50	26,200	0.58
September	640	402	450	.53	26,800	.59
October	437	367	402	.47	24,700	.54
November—a	... .	.....	400	.47	23,800	.52
December—a	. ...	.....	400	.47	24,600	.54
Total Recorded	.....	.....	.....	.....	126,000	.....
Monthly Flow for the Year of 1890:						
January—a	.....	.....	320	.38	19,700	.43
February—a	.....	.....	320	.38	17,800	.39
March—b	. 320	320	320	.38	19,700	.43
April	1.255	280	460	.54	27,400	.60
May	3,195	1,300	2,092	2.46	129,000	2.84
June	3,800	2,060	2,641	3.11	157,000	3.47
July	2,165	800	1,388	1.63	85,400	1.88
August	890	570	761	.89	46,800	1.03
September	690	570	607	.72	36,100	.80
October	650	570	591	.70	36,400	.80
November	570	430	506	.60	30,100	.66
December—a	.....	.....	450	.54	27,600	.61
Total Recorded	3,800	280	871	1.03	633,000	13.94
Monthly Flow for the Year of 1891:						
January—a	.....	.....	400	.47	24,600	.54
February—a	.....	.....	400	.47	22,200	.47
March—a	.....	.....	450	.53	27,700	.61
April—a	.....	.....	500	.59	29,800	.65
May—b	2,535	1,390	1,897	2.23	117,000	2.57
June	2,975	1,615	2,516	2.95	150,000	3.30
July	1,760	1,090	1,534	1.81	94,300	2.06
August	1,050	570	761	.90	46,800	1.03
September	650	570	583	.69	34,700	.77
October	610	570	587	.69	36,100	.80
November	570	370	501	.59	29,800	.66
December	500	430	434	.51	26,700	.59
Total Recorded	2,975	370	880	1.03	640,000	14.05
Monthly Flow for the Year of 1892:						
January	430	430	430	.51	26,400	.59
February	430	400	429	.50	24,700	.55
March	400	400	400	.47	24,600	.54
April—a	.....	.....	450	.53	26,800	.59
May	4,065	465	1,488	1.75	91,500	2.02
June	6,800	2,270	4,163	4.90	248,000	5.48
July	5,170	1,300	2,544	3.00	156,000	3.46
August	1,330	810	957	1.12	58,900	1.30
September	850	650	734	.86	43,700	.97
October	890	650	743	.87	45,700	1.01
November	650	570	589	.69	35,000	.77
December	570	500	549	.64	33,800	.74
Total Recorded	6,800	400	1,123	1.32	815,000	18.02
Monthly Flow for the Year of 1893:						
January	500	430	469	.55	28,800	.64
February—a	.....	.....	430	.51	23,900	.53
March—b	430	370	375	.44	23,100	.51
April	566	430	463	.54	27,600	.61
May	3,360	500	1,414	1.67	87,000	1.93
June—b	5,900	1,810	3,396	3.99	202,000	4.45
August—b	730	570	622	.73	38,200	.84
September	650	570	587	.69	34,900	.77

WEST GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
October	730	500	576	.68	35,400	.82
November	570	430	458	.54	27,200	.60
December	420	370	400	.47	24,600	.54
Total Recorded	5,900	.....	.....	.....	553,000	.....
Monthly Flow for the year of 1894 (c):						
January	370	320	330	.39	20,300	.45
February—b	370	320	340	.40	18,900	.42
March	430	280	310	.36	19,100	.42
April	1,300	320	565	.66	33,600	.74
May	5,900	890	2,760	3.25	170,000	3.75
June—b	6,800	1,480	3,180	3.74	189,000	4.17
Total Recorded	6,800	280	.....	.....	451,000	.....
Mean Monthly Flow for the Period of Record:						
January	500	320	390	.458	24,000	.53
February	430	320	384	.452	21,300	.47
March	430	280	371	.437	22,800	.50
April	1,300	280	488	.574	29,000	.64
May	5,900	465	1,930	2.27	119,000	2.62
June	6,800	1,480	3,180	3.74	189,000	4.17
July	5,170	800	1,820	2.14	112,000	2.47
August	1,300	402	705	.829	43,400	.96
September	856	402	592	.697	35,200	.78
October	890	367	580	.683	35,700	.79
November	650	370	491	.578	29,200	.64
December	570	370	447	.526	27,500	.61
Mean Yearly	6,800	280	948	1.115	688,000	15.18

a—Approximate.

b—Discharge estimated for month by using from 10 to 26 observations.

c—Discharges for 1894 are very uncertain owing to lack of discharge measurements.

Reference for daily flow in U. S. G. S. Annual Reports, 11 Part 2, 12 Part 2, 13 Part 3, 14 Part 2, and Bulletin 131.

WEST GALLATIN RIVER.

Observation Station Located Four Miles Above Salesville, Mont.

Established in 1895—(See note).

Elevation of Station, 5,200 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 860 square miles.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1895:						
August	1,322	913	1,088	1.26	66,900	1.45
September	1,112	706	835	.97	49,700	1.08
October	771	474	602	.70	37,000	.81
November	645	300	441	.51	26,200	.57
December—a	424	352	393	.46	24,200	.53

WEST GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1896:						
January	360	210	250	.29	15,400	.33
February	360	100	250	.29	14,400	.31
March—b	.....	.....	250	.29	15,400	.33
April	560	210	313	.36	18,600	.40
May	3,040	450	950	1.01	58,400	1.16
June	10,750	3,040	7,011	8.15	417,000	9.06
July	4,855	835	2,168	2.52	133,000	2.91
August	1,020	560	755	.88	56,400	1.01
September	692	560	624	.73	37,100	.81
October	645	360	527	.61	32,400	.70
November	450	100	336	.39	20,000	.44
December—b	.....	.....	150	.17	9,220	.20
Total Recorded	10,750	100	1,132	1.31	827,000	17.66
Monthly Flow for the Year of 1897:						
January—b	.....	.....	250	.29	15,400	.33
February—b	.....	.....	250	.29	13,900	.30
March—b	....	.....	300	.35	18,500	.40
April	1,300	350	582	.68	34,600	.75
May	5,780	1,450	3,839	4.46	236,000	5.15
June	5,510	1,750	2,803	3.26	167,000	3.64
July	1,950	900	1,316	1.53	80,900	1.76
August	900	510	637	.74	39,200	.85
September	510	510	510	.59	30,300	.65
October	600	510	526	.61	32,300	.70
November—b	.....	.....	450	.52	26,800	.58
December—b	.....	.....	450	.52	27,700	.60
Total Recorded	.....	.....	993	1.15	723,000	15.71
Monthly Flow for the Year of 1898:						
January—b	.....	.....	600	.70	36,900	.81
February—b	.....	.....	800	.93	44,400	.97
March	630	560	556	.65	34,200	.75
April	1,420	590	841	.98	50,000	1.09
May	5,051	969	2,564	2.98	158,000	3.44
June	7,226	2,615	4,642	5.40	276,000	6.02
July	2,702	1,145	1,948	2.27	120,000	2.62
August	1,100	840	931	1.08	57,200	1.25
September	900	780	810	.94	48,200	1.04
October	840	780	784	.91	48,200	1.05
November	780	670	704	.82	41,900	.91
December	960	636	756	.88	46,500	1.01
Total Recorded	7,226	560	1,328	1.55	962,000	20.96
Monthly Flow for the Year of 1899:						
January—b	.....	.....	700	.81	43,000	.93
February—b	.....	.....	700	.81	38,900	.84
March—b	.....	.....	670	.78	41,200	.90
April	850	650	731	.85	43,500	.94
May	2,030	710	1,228	1.43	75,500	1.65
June	9,700	1,460	5,563	6.47	331,000	7.22
July	7,200	1,870	4,566	5.31	281,000	6.12
August	1,870	1,010	1,319	1.53	81,100	1.76
September	1,010	850	914	1.06	54,400	1.18
October	850	850	850	.99	52,300	1.14
November—b	.....	.....	850	.99	50,600	1.10
December—b	.....	.....	750	.87	46,100	1.00
Total Recorded	9,700	.....	1,570	1.82	1,140,000	24.78
Monthly Flow for the Year of 1900:						
January—b	.....	.....	600	.70	36,900	.81
February—b	.....	.....	500	.58	27,800	.60
March—b	.....	.....	500	.58	30,700	.67
April	1,573	630	960	1.12	57,100	1.25
May	5,410	1,200	3,044	3.54	187,000	4.09
June	5,410	1,300	3,259	3.79	194,000	4.23
July	1,300	560	795	.92	48,900	1.06
August	595	400	517	.60	31,800	.69

WEST GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	560	385	472	.55	28,100	.61
October	560	385	488	.57	30,000	.66
November	500	280	401	.47	23,900	.52
December	460	330	358	.42	22,000	.48
Total Recorded	5,410	280	991	1.15	718,000	15.67
Monthly Flow for the Year of 1901:						
January	605	455	505	.59	31,000	.68
February	495	455	466	.54	26,800	.56
March	475	435	452	.53	27,800	.61
April	700	455	529	.62	31,500	.69
May	7,810	1,230	3,643	4.24	224,000	4.89
June	4,120	1,580	2,233	2.60	133,000	2.90
July	1,440	515	799	.93	49,100	1.07
August	620	495	528	.61	32,500	.70
September	495	475	494	.57	29,400	.64
October	495	475	485	.56	29,800	.65
November	475	435	465	.54	27,700	.60
December	475	455	458	.53	28,200	.61
Total Recorded	7,810	435	921	1.07	671,000	14.60
Monthly Flow for the Year of 1902:						
January	400	360	388	.45	23,900	.52
February	650	360	449	.52	25,000	.54
March	400	360	365	.42	22,400	.48
April	500	360	399	.46	23,700	.51
May	5,565	450	1,697	1.97	104,000	2.27
June	5,225	1,530	3,025	3.52	180,000	3.93
July	1,735	870	1,192	1.39	73,300	1.60
August	810	500	591	.69	36,300	.80
September	500	360	422	.49	25,100	.55
October	450	450	450	.52	27,700	.60
November	450	300	437	.51	26,000	.57
December	450	270	407	.47	25,000	.54
Total Recorded	5,565	270	818	.95	592,000	12.91
Monthly Flow for the Year of 1903:						
January	380	360	369	.429	22,700	.49
February	470	365	382	.444	21,200	.46
March	440	360	370	.430	22,800	.50
April	660	365	429	.499	25,500	.56
May	2,700	440	1,066	1,240	65,600	1.43
June	5,325	2,850	4,125	4,800	245,000	5.35
July	2,850	1,020	1,635	1.901	101,000	2.19
August—c	1,430	470	684	.795	42,100	.92
September	510	415	456	.530	27,100	.59
October	510	440	463	.538	28,500	.62
November	470	370	422	.491	25,100	.55
December	470	370	428	.498	26,300	.57
Total Recorded	5,325	360	902	1.050	653,000	14.23
Monthly Flow for the Year of 1904:						
January	435	335	369	.429	22,700	.50
February	435	335	351	.408	20,200	.44
March	355	320	336	.391	20,700	.45
April	1,310	335	612	.712	36,400	.79
May	5,775	1,065	2,563	2.980	158,000	3.44
June	5,700	3,000	4,400	5,116	262,000	5.71
July	3,525	965	2,053	2,387	126,000	2.75
August	920	455	652	.759	40,200	.88
September	555	455	506	.588	30,100	.66
October	525	435	482	.560	29,600	.65
November	435	400	421	.490	25,000	.55
December	400	335	372	.432	22,900	.50
Total Recorded	5,775	320	1,093	1.271	794,000	17.32

WEST GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
January	395	310	352	.409	21,600	.47
February	670	350	415	.483	23,000	.50
March	395	310	352	.409	21,600	.47
April	605	310	415	.483	24,700	.54
May	1,265	440	690	.802	42,400	.92
June	2,700	1,480	2,155	2.51	128,000	2.80
Total Recorded	.....	.....	.....	.....	261,000	.....
Monthly Flow for the Year of 1910:						
August	530	355	421	.490	25,900	.56
September	430	355	421	.490	25,100	.55
October	530	390	451	.524	27,700	.60
November	502	355	414	.481	28,600	.54
December	430	330	362	.421	22,300	.49
Monthly Flow for the Year of 1911:						
July, 19-31	1,240	800	997	1.16	25,700	.56
August	880	452	614	.714	37,800	.82
September	530	452	477	.555	28,400	.62
October	475	372	447	.520	27,500	.60
November—b	.....	.....	382	.444	22,700	.50
December—b	.....	.....	325	.378	20,000	.44
Mean Monthly Flow for the Period of Record:						
January	.....	.....	438	.509	26,900	.59
February	.....	.....	456	.530	25,300	.55
March	.....	.....	415	.483	25,500	.56
April	1,570	210	581	.676	34,600	.75
May	7,810	440	2,130	2.48	131,000	2.86
June	10,800	1,300	3,920	4.56	233,000	5.09
July	7,200	515	1,830	2.13	112,000	2.46
August	1,870	355	728	.847	44,800	.98
September	1,110	355	578	.672	34,400	.75
October	850	360	546	.635	33,600	.73
November	.....	100	477	.555	28,400	.62
December	.....	.....	434	.505	26,700	.58
Mean Yearly	10,800	100	1,044	1.21	756,000	16.52

a—Mean of 23 days taken as mean for Dec. 1895.

b—Approximate.

c—Aug. 17-31, 1903, estimated.

Note—The station was discontinued in 1905 and re-established in 1910.

Reference for daily flow in U. S. G. S. Annual Reports 18, Part 4, 19 Part 4, 20 Part 4, 21 Part 4, 22 Part 4, Bulletin 140, and Water Supply Papers 11, 15, 27, 36, 39, 49, 52, 66, 75, 84, 99, 130, 172, 286 and 306.

Data compiled from U. S. Irrigation Investigation—Water rights decreed on stream, 88,722 inches in year 1909 (included tributaries).

GALLATIN RIVER.

Observation Station Located at Logan, Montana.

Established in 1895.

Elevation of Station, 4,090 feet.

Elevation of Head Waters, 10,000 feet.

Rainfall observed at Agricultural College, and Manhattan, Montana; Yellowstone Park, Wyo.

Drainage Area, 1,770 square miles.

Character of Drainage Basin: Varies from high mountains to a broad irrigated valley.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1895:						
January—a	.....	.....	800	0.452	49,200	.52
February—a	.....	.....	800	.452	44,400	.47
March—a	.....	.....	950	.536	58,400	.62
April	1,656	953	1,162	.656	69,100	.73
May	3,548	1,814	2,407	1.36	148,000	1.57
June	3,904	1,866	2,537	1.43	151,000	1.60
July	2,868	436	1,051	.594	64,600	.68
August	664	352	480	.271	29,500	.31
September	826	592	722	.408	43,000	.46
October	826	664	702	.396	43,200	.46
November	826	592	712	.402	42,400	.45
December	664	528	610	.345	37,500	.40
Total Recorded	3,904	352	1,078	.608	780,000	8.27
Monthly Flow for the Year of 1896:						
January—a	.....	.....	680	.384	41,800	.44
February	730	630	662	.374	38,100	.40
March—a	.....	.....	700	.395	43,000	.46
April	800	680	712	.402	42,400	.45
May	2,411	800	1,098	.620	67,500	.72
June	6,550	2,793	4,500	2.54	268,000	2.83
July	2,539	730	1,220	.690	75,000	.80
August	800	680	697	.394	42,900	.45
September	730	630	682	.385	40,600	.43
October	730	655	680	.384	41,800	.44
November	680	680	680	.384	40,500	.43
December	730	680	705	.398	43,400	.46
Total Recorded	6,550	630	1,085	.612	785,000	8.31
Monthly Flow for the Year of 1897:						
January—a	.....	.....	700	.395	43,000	.46
February—a	.....	.....	650	.367	36,100	.38
March—a	.....	.....	650	.367	40,000	.42
April	1,450	635	990	.559	58,900	.62
May	6,460	1,390	3,777	2.14	232,000	2.47
June	6,270	1,450	2,900	1.64	173,000	1.83
July	1,330	400	694	.392	42,700	.45
August	450	425	448	.253	27,600	.29
September	550	450	518	.292	30,800	.33
October	695	550	616	.348	37,900	.40
November	800	610	674	.381	40,100	.42
December	870	600	646	.365	39,700	.42
Total Recorded	6,460	400	1,105	.624	802,000	8.49
Monthly Flow for the Year of 1898:						
January—a	.....	.....	1,000	.565	61,500	.65
February—a	.....	.....	700	.395	38,900	.41
March	730	595	653	.369	40,200	.42
April	1,720	640	1,029	.581	61,200	.65
May	4,757	1,000	2,385	1.35	147,000	1.56
June	6,197	2,597	4,577	2.58	272,000	2.88
July	2,462	370	1,004	.567	61,700	.65
August	370	370	370	.209	22,800	.24
September	730	370	646	.364	38,400	.41
October	820	730	790	.446	48,600	.51
November—b	820	730	762	.430	45,300	.48
December—a	.....	.....	800	.452	49,200	.52
Total Recorded	6,197	370	1,226	.692	887,000	9.39

GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1900:						
January—a	.....	.....	900	.509	55,300	.59
February—a	.....	.....	1,000	.565	55,500	.59
March—a	.....	.....	1,000	.565	61,500	.65
April	1,638	940	1,141	.645	67,900	.71
May	4,805	1,575	3,123	1.76	192,000	2.03
June	4,615	605	2,255	1.27	134,000	1.42
July	605	240	328	.185	20,200	.21
August	400	290	341	.193	21,000	.22
September	530	400	484	.273	28,800	.30
October	680	530	606	.342	37,300	.39
November	1,080	605	700	.395	41,700	.44
December	680	605	633	.358	38,900	.41
Total Recorded	4,805	290	1,043	.588	754,000	7.96
Monthly Flow for the Year of 1902:						
January—a	.....	.....	530	.299	32,600	.34
February—a	.....	.....	550	.311	30,600	.32
March	780	560	678	.383	41,700	.44
April—a	.....	.....	700	.395	41,600	.44
May—c	.....	.....	2,320	1.31	143,000	1.51
June—d	.....	.....	2,770	1.56	165,000	1.74
July—a	.....	.....	870	.491	53,400	.57
August	450	382	410	.232	25,200	.27
September	590	356	399	.226	23,700	.25
October	590	590	590	.334	36,300	.38
November	780	590	679	.384	40,400	.43
December—a	.....	.....	600	.339	36,900	.39
Total Recorded	.....	.....	925	.522	670,000	7.08
Monthly Flow for the Year of 1903:						
January—a	.....	.....	700	.395	43,000	.45
February—a	.....	.....	800	.452	44,400	.47
March	1,790	530	788	.445	48,400	.51
April	1,220	710	872	.492	51,900	.55
May	2,635	860	1,515	.856	93,200	.99
June	5,030	2,320	3,749	2.12	223,000	2.36
July	2,570	500	1,181	.668	72,600	.77
August	650	382	467	.264	28,700	.30
September	590	382	468	.264	27,800	.29
October	780	620	712	.402	43,800	.46
November—a	.....	.....	700	.395	41,700	.44
December—a	.....	.....	600	.339	36,900	.39
Total Recorded	5,030	382	1,046	.591	755,000	7.98
Monthly Flow for the Year of 1904:						
January—e	670	385	462	.261	28,400	.30
February	740	360	524	.296	30,100	.31
March	880	385	478	.270	29,400	.31
April	1,980	435	1,169	.660	69,600	.74
May	5,400	1,770	2,772	1.57	170,000	1.81
June	4,940	2,205	3,897	2.20	232,000	2.45
July	2,325	670	1,290	.729	79,300	.84
August	605	230	357	.202	22,000	.23
September	740	435	544	.308	32,400	.34
October	740	705	738	.416	45,400	.48
November	740	740	740	.418	44,000	.47
December	955	635	825	.466	50,700	.54
Total Recorded	5,400	230	1,150	.650	833,000	8.82
Monthly Flow for the Year of 1905:						
January, 11-29	1,210	605	741	.418	27,900	.30
March—a	.....	.....	580	.328	35,700	.38
April—a	.....	.....	500	.282	29,800	.32
May	1,870	515	836	.472	51,400	.54
June	2,265	1,035	1,592	.900	94,700	1.00
July	1,570	178	428	.242	26,300	.28
August	260	178	225	.127	13,800	.15
September	435	230	279	.158	16,600	.18

GALLATIN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
October	605	435	499	.282	30,700	.32
November	670	545	617	.348	36,700	.39
Total Recorded	2,265	178	.....	.356	364,000	3.86
Mean Monthly Flow for the Period of Record:						
January	.....	385	724	.408	44,500	.47
February	.....	300	711	.402	39,500	.42
March	1,790	385	720	.407	44,300	.47
April	1,980	435	919	.519	54,700	.58
May	6,460	515	2,250	1.27	138,000	1.46
June	6,550	605	3,200	1.81	190,000	2.02
July	2,868	178	896	.506	55,100	.58
August	890	178	422	.239	26,000	.28
September	826	230	527	.298	31,400	.33
October	826	435	659	.372	40,500	.43
November	1,080	545	696	.393	41,400	.44
December	955	528	677	.382	41,600	.44
Mean Yearly	6,550	178	1,030	.582	747,000	7.92

a—Approximate.
b—Mean for 21 days taken as mean for Dec. 1898.
c—May, 1902, estimated from 28 days observations.
d—Estimated June 29 and 30, 1902.
e—Mean of Jan. 11–31, 1904, taken as mean for month.

Note—The mean rainfall for stations at Agricultural College, Manhattan & Yellowstone Park for the above period was 13.29 inches, which is probably less than the mean over the entire area. The mean annual run-off was 60% of the mean rainfall for the above stations, the maximum was 67% in 1904, and the minimum 29% in 1902.

Gage heights, but no monthly tables are published for 1902, and the following measurements were made: Apr. 15, 735 sec.-ft.; May 27, 4,590 sec.-ft.; June 26, 172 sec-ft.; Sept. 3, 264 sec.-ft., and Oct. 20, 547 sec.-ft.

References: U. S. G. S. Bulletins, Nos. 131, 140; U. S. G. S. Annual Reports, Nos. 18 Part 4, 19 Part 4, 20 Part 4, and 22 Part 4; U. S. G. S. Water Supply Papers, 11, 15, 27, 26, 49, 66, 75, 84, 99, 130, 172.

EAST GALLATIN RIVER.

On September 2, 4 and 5, 1896, measurements were made showing discharges of 33, 184 and 200 second-feet for the East Gallatin. They are given in the 18th Annual Report of the U. S. G. S., but the report does not state the places of measurement.

During September, 1897, a series of measurements was made of the East Gallatin and tributaries, ditches and canals, to determine the loss or gain by seepage. The results are recorded in the 19th Annual Report of the U. S. G. S., and give measurements at nine places on the river itself. These vary from about 50 second-feet near the mouth of Bridger Creek to 20 second-feet near Belgrade, and a couple of miles above its mouth the discharge was 337 second-feet.

BOZEMAN CREEK.

Near Bozeman, Montana.

Station Established in 1904.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1904:				
August, 18–31	21.3	15.9	19.6	542
September	19.2	16.4	17.7	1,050
October	17.2	15.9	16.6	1,020
November, 1–12	15.9	15.9	15.9	378

The following miscellaneous measurements have been made on Bozeman Creek.

May	12, 1897	21. second-feet.
May	29, 1897	60. second-feet
June	22, 1897	21. second-feet.
July	10, 1897	21. second-feet.
July	23, 1897	30. second-feet.
Aug.	9, 1897	21. second-feet.
Sept.	7, 1897	21. second-feet.
Sept.	27, 1897	12. second-feet.
April	17, 1901	21. second-feet.

References: U. S. G. S. Water Supply Papers 15 and 66.

MIDDLE CREEK.

Observation Station Located Nine Miles South of Bozeman, Mont.

Established in 1895.
Elevation of Station, 6,000 feet.
Elevation of Head Waters, 9,500 feet.
Drainage Area, 55 square miles.
Character of Drainage Basin: Mountains.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1895:						
August	.....	.....	58	1.05	3,570	1.21
September	.....	.....	50	.90	2,980	1.00
October	.....	.....	51	.92	3,140	1.06
November	.....	.....	46	.84	2,740	.93
Monthly Flow for the Year of 1896:						
April	37	29	33	.61	1,960	.68
May	263	42	96	1.74	5,900	2.01
June	610	193	381	6.92	22,700	7.72
July	267	74	164	2.98	10,100	3.44
August	52	39	44	.80	2,700	.92
September	44	37	40	.72	2,380	.80
October	38	38	38	.69	2,340	.79
Monthly Flow for the Year of 1898:						
April, 18–30	.....	.....	195	3.55	5,020	1.72
May	466	118	270	4.91	16,600	5.66
June	956	153	429	7.80	25,500	8.70
July	298	88	172	3.13	10,600	3.61
August	77	57	65	1.18	3,990	1.36
September	57	48	53	.96	3,180	1.07
October, 1–21	.....	.....	52	.95	2,260	.78
Monthly Flow for the Year of 1899:						
May, 7–31	.....	.....	164	2.98	8,150	2.77
June	760	232	504	9.16	30,000	10.22
July	564	153	334	6.07	20,600	7.00
August	153	66	104	1.89	6,380	2.18
September	77	48	57	1.04	3,410	1.16
October	66	48	49	.89	2,990	1.03
Monthly Flow for the Year of 1900:						
June, 18–30	.....	.....	222	4.04	5,720	1.95
July	118	66	89	1.62	5,470	1.87
August	88	48	55	1.00	3,380	1.15
September	48	48	48	.87	2,860	.97
October, 1–13	.....	.....	48	.87	1,240	.42
Monthly Flow for the Year of 1902:						
May, 15–31	.....	.....	180	3.27	6,070	2.07
June	361	122	221	4.02	13,200	4.49
July	181	72	116	2.11	7,130	2.43
August	181	53	74	1.35	4,560	1.56
September	53	49	50	.91	2,980	1.02
Monthly Flow for the Year of 1904:						
October	45	45	45	.818	2,770	.94
November—a	.....	.....	35	.637	2,080	.71

MIDDLE CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Mean Monthly Flow for the Recorded Period:						
April	.....	29	82	1.49	4,880	1.66
May	466	42	183	3.33	11,200	3.84
June	956	122	371	6.75	22,100	7.53
July	564	66	175	3.18	10,800	3.67
August	181	39	66.7	1.21	4,100	1.40
September	77	37	49.7	.904	2,960	1.01
October	66	38	47.0	.854	2,890	.98
November	.....	.....	40.5	.736	2,410	.82
Mean	.....	.....	127	2.31	61,300	20.91

a—Approximate.

Note—Gage heights were not read during 1897, 1901 and 1903, but the following measurements were made:

1897—May 3, 174 sec.-ft.; May 21, 340 sec.-ft.; June 4, 233 sec.-ft.; June 21, 184 sec.-ft.; July 6, 133 sec.-ft.; July 19, 108 sec-ft.; Aug. 1, 54 sec.-ft.; Aug. 10, 44 sec.-ft., and Sept. 20, 42 sec.-ft.

1903—April 17, 27 sec.-ft.; May 21, 89 sec.-ft.; June 3, 503 sec.-ft.: June 13, 348 sec.-ft.; June 28, 326 sec.-ft.; July 17, 280 sec.-ft.; Sept. 6, 60 sec.-ft., and Oct. 14, 48 sec.-ft.

The data for 1904 was obtained from records in the State Engineer's office.

Reference for daily flow in U. S. G. S. Annual Reports, 18 part 4, 19 part 4, 20 part 4, 21 part 4, 22 part 4; Bulletin 140; Water Supply Papers Nos. 15, 27, 36, 49, 75, 84, 99.

CROW CREEK, NEAR RADERSBURG.

A gaging station was maintained from April 13 to June 29, 1901, but discharges were measured at only two gage heights. The following measurements have been made:

October 13, 1900	16	second-feet
April 13, 1901	15	second-feet
May 29, 1901	199	second-feet
May 29, 1901	190	second-feet
August 28, 1902	18.1	second-feet
August 28, 1902	18.9	second-feet
May 1, 1903	21	second-feet
May 28, 1903	106	second-feet
May 28, 1903	106	second-feet
August 30, 1903	13	second-feet
September 26, 1903	26	second-feet

References: U. S. G. S. Water Supply Papers 49, 66, 84 and 99.

PRICKLY PEAR CREEK.

Observation Station Located in Sec. 34, T. 9 N., R. 3 W., One Mile Below Clancy, Mont.

Established in 1908.
Elevation of Station, 4,200 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 178 square miles.
Character of Drainage Basin: **Mountainous; a narrow irrigated valley.**

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
January, 1–18	63	32	51.4	1,840
March, 17–31	51	46	48.3	1,440
April	80	32	50.3	2,990
Monthly Flow for the Year of 1910:				
July, 12–31	23	14	15.8	627
August	36	12	14.0	861
September	84	31	46.8	2,780
October	53	31	38.4	2,360
November	42	25	34.5	2,050
December	62	..	a32.4	1,990
Total Recorded	..	..	....	10,700
Monthly Flow for the Year of 1911:				
January	..	..	a30	1,840
February	..	..	a25	1,390
March	..	..	b29.5	1,810
April	232	17	43.9	2,610
May	158	52	83.7	5,150
June	310	88	189	11,200
July	151	22	51.7	3,180
August	55	20	29.8	1,830
September	43	20	30.1	1,790
October	61	29	34.3	2,110
November	..	..	c22.6	1,340
December	..	..	a20	1,230
Total Recorded	..	..	49.7	35,500

a—Estimated.
b—Estimated March 1–17.
c—Estimated November 10–30.

Note—Although this station was established in 1908, a rating was not obtained until 1909. During 1908 the following discharge measurements were made: July 15, 97 sec.-ft.; August 10, 40 sec.-ft.; October 10, 80 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

PRICKLY PEAR CREEK.

Observation Station Located in N. E. ¼ Sec. 36, T. 10 N., R. 3 E., at East Helena, Mont.

Established in 1908.
Elevation of Station, 3,880 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 250 square miles.
Character of Drainage Basin: Mountainous; and irrigated valley lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1908:				
July, 19–31	115	42	79.5	2,050
August	95	20	44.2	2,720
September	58	28	40.2	2,390
October	138	42	88.7	5,450
November	76	20	56.1	3,340
Total Recorded	...	...	.....	16,000
Monthly Flow for the Year of 1909:				
March	90	36	65.8	4,050
April	112	36	67.8	4,030
May	415	70	183	11,300
June	535	212	344	20,500
July	284	59	141	8,670
August	98	30	53.6	3,300
September	179	43	75.4	4,490
October	52	37	47.2	2,900
November	70	52	66.8	3,970
Total Recorded	...	...	.....	63,200
Monthly Flow for the Year of 1910.				
March	...	...	a93.3	5,740
April	...	...	68.6	4,080
May	...	...	71.9	4,420
June	...	...	73.6	4,380
November	...	...	a39.1	2,330
December	...	...	a38	2,340
Total Recorded	...	...	.....	23,300
Monthly Flow for the Year of 1911.				
January	...	...	b35	2,150
February	...	...	b31	1,790
March	...	...	c56.5	3,470
April	88	23	39.8	2,370
May	140	32	75.4	4,640
June	288	100	197	11,700
July	140	32	61.2	3,760
August	51	26	36.9	2,270
September	37	26	29.9	1,780
October	68	26	39.5	2,430
November	...	...	d26.1	1,550
December	...	...	b25	1,540
Total Recorded	288	...	54.4	39,400
Mean Monthly Flow for the Period of Record:				
January	...	...	35	2,150
February	...	...	31	1,720
March	...	...	71.9	4,420
April	112	23	58.7	3,490
May	415	32	110	6,760
June	535	100	205	12,200
July	284	32	97	5,960
August	98	20	44.9	2,760
September	179	26	48.5	2,890
October	138	26	58.5	3,600
November	76	20	47.0	2,800
December	...	...	31.5	1,940
Mean Yearly	535	20	69.9	50,700

a—Discharge estimated March 1–5, November 1–14, and December, 1910, by comparison with the Clancy station, and from discharge measurements.
b—Estimated.
c—Estimated March 1–22.
d—Estimated November 9–30.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos 246, 266, 286 and 306.
Water Rights Recorded on Stream: Entire normal flow.

LUMP GULCH CREEK.

Observation Station Located in Sec. 4, T. 8 N., R. 3 W., Near Clancy, Mont.

Established in 1908.
Elevation of Station, 4,400 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 43 square miles.
Character of Drainage Basin: Mountainous; a very small irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
July, 15–31	21	11	16.2	547
August	9	5	6.09	374
September	9	3.9	7.53	448
October	19	9	13.6	836
November	14	12	12.7	756
Total Recorded	...	...	....	2,960
Monthly Flow for the Year of 1909:				
March	13.6	9.5	11.6	713
April	29	13.6	18.1	1,080
May	89	19.5	40.7	2,500
June	100	46	65.7	3,910
July	51	17.0	28.8	1,770
August	14	10.0	12.4	762
September	18	11.5	13.6	809
October	10.4	8.8	9.11	560
November	8.8	8.8	8.80	524
Total Recorded	....	....	....	12,600
Monthly Flow for the Year of 1910:				
January	....	....	a9.00	552
February	....	....	a9.00	500
March	38	9	b18.8	1,160
April	29	18	22.3	1,330
May	18	7.2	13.4	824
June	16	2.8	6.57	391
July	1.7	1.0	1.27	78
August	1.7	.5	.616	38
September	7.2	1.7	4.11	245
October	4.0	2.8	3.77	232
November	11.	5.6	8.75	521
December	....	....	a4.00	246
Total Recorded	....	....	8.47	6,120
Monthly Flow for the Year of 1911:				
January	....	....	a3.00	184
February	....	....	a3.00	167
March	25	....	c15.1	928
April	28	18	21.5	1,280
May	30	18	22.6	1,390
June	52	16	28.9	1,720
July	16	0.8	6.42	395
August	3.8	0.8	2.79	172
September	5.0	2.6	4.76	283
October	5.0	5.0	5.00	307
November	....	.....	d5.00	298
December	....	....	a3.50	215
Total Recorded	52	.8	10.1	7,349
Mean Monthly Flow for the Recorded Period:				
January	....	....	6.00	369
February	....	....	6.00	333
March	38	....	15.2	935
April	29	13.6	20.6	1,230
May	89	7.2	25.6	1,570
June	100	2.8	33.7	2,000
July	51	0.8	12.7	781
August	14	0.5	5.47	336
September	18	1.7	7.50	446
October	19	2.8	7.87	484

LUMP GULCH CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
November	14	....	8.81	524
December	....	....	3.75	231
Mean Yearly	100	0.5	12.8	9,240

a—Estimated
b—Estimated March 1–5, 1910.
c—Estimated March 1–11, 1911.
d—Estimated November 9–30, 1911.
Reference for daily flow in U. S. G. S Water Supply papers Nos. 246–266–286 and 306.
Water rights recorded on stream, entire normal flow.

TENMILE CREEK.

Observation Station Located in S. E. ¼ Sec. 22, T. 10 N., R. 4 W., at Broadwater Hotel, near Helena, Mont.

Established in 1908.
Elevation of Station, 4,000 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 105 square miles.
Character of Drainage Basin: Mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
July, 8–31	25	2.5	11.8	562
August	11.5	.8	1.76	108
September	15.0	.5	5.20	309
October	109	15.0	52.8	3,250
November	54	15.0	36.4	2,170
Monthly Flow for the Year of 1909:				
March	19.0	2.5	12.4	762
April	59	8.5	22.6	1,340
May	477	32	199	12,200
June	477	124	283	16,800
July	124	19.0	60.3	3,710
August	25	6.0	9.79	602
September	40	6.0	19.5	1,160
October	32	15.0	16.9	1,040
November	40	11.5	23.2	1,380
December, 1–9	15.0	2.5	6.95	124
Total Recorded	....	....	....	39,100
Monthly Flow for the Year of 1910:				
January	....	....	a3.0	184
February	....	....	a4.0	222
March	74	....	a31.2	1,920
April	85	43	59.2	3,520
May	63	10	30.7	1,890
June	15	.8	4.44	264
July	2.7	.2	1.04	64
August	.2	.15	.144	9
September	15	.15	3.73	222
October	19	3.6	6.85	421
November	13	3.2	9.83	585
December	....	....	a4.99	307
Total Recorded	....	....	13.3	9,610

TEN MILE CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
January	....	....	b5.0	307
February	....	....	b6.0	333
March	....	....	b11.0	676
April	79	12	27.1	1,610
May	133	42	83.5	5,130
June	230	46	123	7,320
July	148	1.5	29.0	1,780
August	10	.6	2.22	136
September	6.4	.6	3.65	217
October	37	4.3	15.6	959
November	....	....	b15.0	893
December	....	....	b9.0	553
Total Recorded	....	....	27.5	19,900
Mean Monthly Flow for the Period of Record:				
January	....	....	4.0	246
February	....	....	5.0	278
March	74	2.5	18.2	1,120
April	85	8.5	36.3	2,160
May	477	10	104	6,400
June	477	.8	137	8,150
July	148	.2	28.7	1,760
August	25	.15	3.48	214
September	40	.15	8.02	477
October	109	3.6	23.0	1,410
November	54	3.2	21.1	1,260
December	....	....	6.99	430
Mean Yearly	477	.15	33.0	23,900

a—Discharge estimated January 1–March 6, and December 11–31, 1910.
b—Discharge estimated January, February, March and November 9–December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.
Water Rights Recorded on Stream: Entire low water flow.

SEVEN-MILE CREEK.

Observation Station Located in S. W. ¼ Sec. 31, T. 11 N., R. 4 W., Near Birdseye, Mont.
Established in 1909.
Elevation of Station, 4,200 feet.
Elevation of Head Waters, 6,000 feet.
Drainage Area, 34 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April	12.6	8.3	10.3	613
May	45	10.7	22.2	1,360
June	72	16.1	35.7	2,120
July	55	8.3	13.5	830
August	7.6	4.2	5.41	333
September	16.1	4.6	6.77	402
October	7.6	5.4	7.30	449
November	9.0	6.4	7.65	455
December, 1–7	9.0	6.4	8.63	120
Total Recorded	....	....	....	6,680
Monthly Flow for the Year of 1910:				
January	....	....	a4.0	246
February	....	....	a4.0	222
March	....	....	a10	615
April	17	4.4	a11.7	696

SEVEN MILE CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
May	12	4.4	9.07	558
June	8.0	1.9	4.77	284
July	10	.1	3.74	230
August	6.2	.1	1.90	117
September	4.4	.6	3.39	202
October	4.4	1.2	3.36	207
November	6.2	1.9	4.10	244
December	....	....	a1.9	117
Total Recorded	....	....	5.16	3,740
Monthly Flow for the Year of 1911:				
January	....	....	b3.0	184
February	....	....	b3.0	167
March	6.7	2.8	b5.16	317
April	5.2	1.2	2.82	168
May	10	.4	5.60	344
June	20	5.2	12.2	726
July	15	2.8	6.32	389
August	6.7	.4	2.64	162
September	1.8	.4	.85	51
October	8.6	.4	2.70	166
November	....	....	b5.0	298
December	....	....	b3.0	184
Total Recorded	20	.4	4.36	3,160
Mean Monthly Flow for the Period of Record:				
January	....	....	3.5	215
February	....	....	3.5	194
March	....	....	7.58	466
April	17	1.2	8.27	492
May	45	.4	12.3	756
June	72	1.9	17.6	1,050
July	55	.1	7.85	483
August	7.6	.1	3.32	204
September	16.1	.4	3.67	218
October	8.6	.4	4.45	274
November	....	....	5.58	332
December	....	....	3.1	191
Mean Yearly	72	.1	6.73	4,880

a—Discharge estimated January 1 to April 8 and December 8 to 31, 1910.
b—Discharge estimated January 1 to March 20, and November 6 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266, 286 and 306.
Water Rights Recorded on Stream: Entire flow.

ESTIMATED FLOW OF SEVEN-MILE CREEK.

At Dr. Head's Ranch, Near Helena, Mont.

Established in 1908.
Elevation of Station, 3,900 feet.
Elevation of Head Waters, 6,000 feet.
Drainage Area, 49 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
July, 16–31	12	10	10.7	342
August, 1–26	25	5.5	12.8	657

Reference: U. S. G. S. Water Supply Paper No 246.
Water Rights Recorded on Stream: Entire flow is used.

LITTLE PRICKLY PEAR CREEK.

Observation Station Located in N. W. ¼ Sec. 24, T. 12 N., R. 7 W., Near Marysville, Mont.
Established in 1909.
Elevation of Station, 4,700 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 19.5 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
May, 18–31	86	14.0	47.6	1,320
June	79	28	53.8	3,200
July	25	15.4	19.1	1,170
August	13.6	10.3	11.7	719
September	10.3	7.4	9.12	543
October	7.4	6.0	7.26	446
November	6.0	4.7	5.13	305
December	4.7	3.6	4.56	280
Total Recorded	....	....	....	7,980
Monthly Flow for the Year of 1910:				
January	....	....	a3.3	203
February	....	....	a3.0	167
March	12	2.3	a4.58	282
April	26	6.9	15.4	916
May	24	15	18.9	1,160
June	17	8.4	12.7	756
July	10	5.4	8.58	528
August	6.9	4.2	5.63	346
September	6.9	4.2	5.21	310
October	4.2	3.1	4.02	247
November	3.6	3.1	3.33	198
December	3.1	2.8	2.96	182
Total Recorded	26	2.3	7.30	5,300
Monthly Flow for the Year of 1911:				
January	....	....	b2.5	154
February	....	....	b1.5	83
March	2.4	1.2	b1.70	104
April	7.4	2.4	3.69	220
May	23	8.0	16.7	1,030
June	30	18	23.5	1,400
July	18	10	13.9	855
August	10	4.8	7.89	485
September	8	4.8	6.68	397
October	7.4	6.2	6.71	413
November	....	....	b5.5	327
December	....	....	b5.0	307
Total Recorded	30	1.2	7.94	5,780
Mean Monthly Flow for the Years of 1909–11:				
January	....	....	2.90	178
February	....	....	2.25	125
March	12	1.2	3.14	193
April	26	2.4	9.54	568
May	86	8.0	23.8	1,460
June	79	8.4	30.0	1,790
July	25	5.4	13.9	855
August	13.6	4.2	8.41	517
September	10.3	4.2	7.00	417
October	7.4	3.1	6.00	369
November	6.0	3.1	4.65	277
December	....	....	4.17	256
Mean Yearly	86	1.2	9.65	7,000

a—Discharge estimated January 1 to March 12, 1910.
b—Discharge estimated January 1 to March 7, and November 12 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266, 286 and 306.

LITTLE PRICKLY PEAR CREEK.

Observation Station Located in N. W. ¼ Sec. 9, T. 12 N., R. 5 W., Near Canyon Creek, Mont.
Established in 1909.
Elevation of Station, 4,200 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 180 square miles.
Character of Drainage Basin: Mountainous; small irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
Monthly Flow for the Year of 1909:				
April	88	28	54.1	3,220
May	370	60	181	11,100
June	365	143	257	15,300
July	127	9	49.9	3,070
August	34	11	15.1	928
September	46	19	37.8	2,250
October	34	13	26.1	1,600
November	42	13	28.1	1,670
December	26	19	23.0	502
Total Recorded	....	....	....	39,600
Monthly Flow or the Year of 1910:				
January	....	....	a25	1,540
February	....	....	a25	1,390
March	....	....	50.2	3,090
April	176	58	119	7,080
May	36	3	42.6	2,620
June	14	0	3.28	195
July	2.2	0	.91	56
August	3.0	0	1.38	85
September	12	5	8.88	528
October	31	10	18.5	1,140
November	31	20	25.1	1,490
December	25	18	22.5	1,380
Total Recorded	...	....	28.5	20,600
Monthly Flow for the Year of 1911:				
January	....	....	a18	1,110
February	....	....	a15	833
March	44	13	b25.8	1,590
April	74	30	44.3	2,640
May	111	55	79.8	4,910
June	129	13	54.8	3,260
July	5.0	0	2.32	143
August	13	1.5	5.42	333
September	44	13	26.5	1,580
October	....	....	a20	1,230
November	....	....	a15	893
December	....	....	a12	738
Total Recorded	....	....	26.6	19,300
Mean Monthly Flow for the Years of 1909–1911:				
January	....	....	21.5	1,320
February	....	....	20.0	1,110
March	....	....	38.0	2,340
April	176	28	72.5	4,310
May	370	3	101	6,210
June	365	0	105	6,250
July	127	0	17.7	1,090
August	34	0	7.30	449
September	46	5	24.4	1,450
October	...	....	21.5	1,320
November	....	....	22.7	1,350
December	...	....	19.2	1,180
Mean Yearly	370	0	39.2	28,400

a—Estimated.
b—Estimated March 1–6, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266, 286 and 306.
Water Rights Recorded on Stream: Entire normal flow.

DEADMAN CREEK.

Observation Station Located in S. E. ¼ Sec. 25, T. 12 N., R. 7 W., Near Marysville, Mont.

Established in 1909.
Elevation of Station, 4,800 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 9.8 square miles.
Character of Drainage Basin: Mountainous; small irrigated basin.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April	16.9	3.5	7.96	474
May	68	16.9	44.9	2,760
June	124	34	68.0	4,050
July	42	9.0	25.4	1,560
August	9.0	7.2	7.84	482
September	9.0	5.4	7.02	418
October	5.4	5.4	5.40	332
November	5.4	4.1	4.36	259
December, 1–11	4.1	4.1	4.10	89.5
Total Recorded	....	....	....	10,400
Monthly Flow for the Year of 1910:				
January	....	....	a4	246
February	....	....	a4	222
March	32	4	a13.7	842
April	62	10	31.3	1,860
May	74	18	39.0	2,400
June	18	6.3	11.0	655
July	6.3	5.1	6.00	369
August	4.3	3.1	3.58	220
September	4.3	2.4	3.36	200
October	4.3	3.1	3.37	207
November	7.4	4.3	6.35	378
December	7.4	6.3	6.79	418
Total Recorded	74	2.4	11.0	8,020
Monthly Flow for the Year of 1911:				
January	....	....	b5.0	307
February	....	....	b4.0	222
March	10	3.6	b6.3	387
April	34	8.8	15.1	898
May	57	30	41.4	2,550
June	40	30	34.5	2,050
Total Recorded	....	....	17.7	6,410
Mean Monthly Flow for the Period of Record:				
January	....	....	4.5	277
February	....	....	4.0	222
March	32	3.6	10.0	615
April	62	3.5	18.1	1,080
May	74	16.9	41.8	2,570
June	124	6.3	37.8	2,250
July	42	5.1	15.7	965
August	9.0	3.1	5.71	351
September	9.0	2.4	5.19	309
October	5.4	3.1	4.38	269
November	7.4	4.1	5.36	319
December	7.4	4.1	5.48	337
Mean Yearly	124	2.4	13.2	9,560

a—Discharge estimated January 1 to March 13, 1910.
b—Discharge estimated January 1 to March 12, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266, 286 and 306.

LOST HORSE CREEK.

Observation Station Located in S. E. ¼ Sec. 25, T. 12 N. R. 7 W., near Marysville, Mont.
Established in 1909.
Elevation of Head Waters, 6,500 feet.
Elevation of Station, 4,800 feet.
Drainage Area, 4 square miles.
Character of Drainage Basin: Mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 2-30	3.6	0.4	2.00	115
May	23	4.2	10.9	670
June	42	11.5	24.8	1,480
July	16.5	8.8	12.3	756
August	9.8	4.5	6.09	374
September	5.9	.8	4.07	242
October	1.1	.8	.95	58.4
November	1.1	.5	.76	45.2
December, 1-11	.4	.2	.28	6.11
Total Recorded	....	.....	.....	3,750
Monthly Flow for the Year of 1910 (b):				
March	5.0	.....	a2.26	139
April	6.6	1.1	3.37	205
May	7.6	1.4	4.20	258
June	1.9	1.3	1.56	93
July	1.3	.7	1.19	73
August	.4	.1	.219	13
Monthly Flow for the Year of 1911:				
April	1.8	0.0	.33	20
May	3.8	1.8	2.91	179
June	4.0	2.8	3.22	192

a—Discharge estimated Mar 1 to 13, 1910.
(b)—There was very little flow during January, February, and September to December. Total run off for the year estimated at 828 acre feet.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 266, 286 and 306.

MARSH CREEK.

Observation Station Located in S. E. ¼ Sec. 6 T. 12 N., R. 6 W., Marysville, Montana.
Established in 1909.
Elevation of Station, 4,800 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 6,9 square miles.
Character of Drainage Basin: A narrow irrigated mountain valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April	8.4	1.7	2.43	145
May	13.5	2.8	6.66	410
June	15.0	7.1	11.4	678
July	9.4	3.4	5.71	351
August	3.4	2.0	2.45	151
September	5.9	1.6	1.88	112
October	1.6	1.6	1.60	98
November	2.3	1.6	1.65	98
Total Recorded	15.0	.....	.....	2,040

MARSH CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
January	....	.....	a1.50	92
February	....	.....	a1.50	83
March	....	.....	a3.00	184
April	5.0	3.4	4.45	265
May	5.8	3.6	4.63	285
June	3.6	2.8	3.23	192
July	3.6	1.8	2.30	141
August	2.0	1.7	1.80	111
September	1.7	1.5	1.64	98
October	1.6	1.3	1.41	87
November	1.4	1.3	1.36	81
December	....	.....	b1.30	80
Total Recorded	....	.....	2.34	1,700
Monthly Flow for the Year of 1911:				
January	....	.....	a1.30	80
February	....	.....	a1.30	72
March	2.4	1.3	c1.78	109
April	2.4	1.9	2.05	122
May	4.4	2.0	2.53	156
June	8.4	2.0	2.95	176
July	3.0	2.1	2.42	149
August	2.9	1.6	1.98	122
September	2.9	1.6	1.80	107
October	2.1	1.6	1.84	113
November	....	.....	c1.7	101
December	....	.....	a1.5	92
Total Recorded	....	.....	1.93	1,400
Mean Monthly Flow for the Years of 1909–1911:				
January	....	.....	1.40	86
February	....	.....	1.40	78
March	....	.....	2.39	147
April	8.4	1.7	2.98	177
May	13.5	2.0	4.61	284
June	15 0	2.0	5.86	349
July	9.4	1.8	3.48	214
August	3.4	1.6	2.08	128
September	5.9	1.5	1.77	105
October	2.1	1.3	1.62	100
November	....	.....	1.57	93
December	....	.....	1.40	86
Mean Yearly	15.0	1.3	2.55	1,850

a—Estimated.
b—Estimated Dec. 11 to 31, 1910.
c—Estimated Mar. 1 to 17, and Dec. 7 to 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 266, 286 and 306.

DEARBORN RIVER.

Observation Station Located in S. E. ¼ Sec. 28, T. 18 N., R. 7 W., near Clemons, Mont.
Established in 1908.
Elevation of Head Waters, 7,500 feet.
Character of Drainage Basin: Mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
May	566	100	292	18,000
June	932	256	438	16,500
July	248	77	138	8,480
August	77	12	47	2,890

DEARBORN RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
September	36	8	19	1,130
October	336	30	114	7,010
November	70	46	60.1	3,580
Total Recorded	.....	.....	.....	57,590
Monthly Flow for the Year of 1909:				
March, 19-31	27	20	24.2	624
April	58	27	36.9	2,200
May	640	56	291	17,900
June	1,030	425	770	45,800
July	415	171	255	15,700
August	163	62	98.4	6,050
September	349	82	122	7,260
October	84	58	63.4	3,900
November	66	64	65.5	1,430
Total Recorded	.....	.....	.....	101,000
Monthly Flow for the Year of 1910:				
January	.....	.....	a60	3,690
February	.....	.....	a65	3,610
March	116	.....	a87.6	5,380
April	436	119	263	15,600
May	492	188	283	17,400
June	205	98	148	8,810
July	97	52	69.6	4,280
August	56	31	37.7	2,320
September	115	31	68.6	4,080
October	58	46	51.3	3,150
November	55	50	52.1	3,100
December	49	.....	a36.8	2,260
Total Recorded	.....	.....	102	73,700
Monthly Flow for the Year of 1911:				
January	.....	13.7	b35	2,150
February	.....	.....	b30	1,670
March	52	30	b38.4	2,360
April	137	48	78.3	4,660
May	800	140	297	18,300
June	1,160	182	425	25,300
July	176	71	106	6,520
August	79	46	60.1	3,700
September	142	44	99.8	5,940
October	81	44	61.4	3,780
November	.....	.....	b40	2,380
December	.....	.....	b35	2,150
Total Recorded	1,160	.....	109	78,900
Mean Monthly Flow for the Period of Record:				
January	.....	13.7	47.5	2,920
February	.....	.....	47.5	2,640
March	116	20	56.5	3,470
April	436	27	126	7,500
May	800	56	291	17,900
June	1,160	98	445	26,500
July	415	52	142	8,730
August	163	12	60.8	3,740
September	349	8	77.4	4,610
October	336	30	72.5	4,460
November	70	46	54.4	3,240
December	.....	.....	35.9	2,210
Mean Yearly	1,160	8	121	87,900

a—Estimated Jan. 1 to Mar. 5, and Dec. 20 to 31, 1910.

b—Estimated Jan. 1 to Mar. 20, and Nov. and Dec., 1911.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.

FALLS CREEK.

Observation Station Located Just Above Its Mouth Near Clemons, Mont.
Established in 1908.
Elevation of Head Waters, 7,500 feet.
Character of Drainage Basin: Very mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
July, 13–31	73	47	56.2	2,000
August	48	29	38.0	2,340
September	34	24	27.0	1,610
October	83	34	53.0	3,260
November	44	32	37.9	2,560
Total Recorded	.....	.....	.....	11,800
Monthly Flow for the Year of 1909:				
March	17.1	15.0	16.3	1,000
April	23	16.4	18.3	1,090
May	332	24	139	8,550
June	540	290	428	25,500
July	225	108	146	8,980
August	103	42	61.5	3,780
September	168	55	80.4	4,780
October	58	40	44.2	2,720
November, 1–11	39	29	33.2	724
Total Recorded	.....	.....	.....	57,100
Monthly Flow for the Year of 1910:				
January	.....	.....	a25	1,540
February	.....	.....	a25	1,390
March	65	.....	a36.6	2,250
April	152	60	99.0	5,890
May	164	71	94.9	5,840
June	71	36	52.3	3,110
July	36	22	28.5	1,750
August	22	17	18.8	1,160
September	41	18	28.6	1,700
October	33	21	27.7	1,700
November	23	21	21.7	1,290
December	21	.....	a19.5	1,200
Total Recorded	.....	.....	39.8	28,800
Monthly Flow for the Year of 1911:				
January	.....	.....	b10	615
February	.....	.....	b10	555
March	14	.....	b10.9	670
April	42	15	25.1	1,490
May	180	42	103	6,330
June	285	88	172	10,200
July	85	40	56.5	3,470
August	45	31	37.1	2,280
September	93	31	60.5	3,600
October	55	31	46.3	2,850
November	.....	.....	b25	1,490
December	.....	.....	b15	922
Total Recorded	285	.....	47.7	34,500
Mean Monthly Flow for the Period of Record:				
January	.....	.....	17.5	1,080
February	.....	.....	17.5	972
March	65	.....	21.3	1,310
April	152	15	47.5	2,830
May	332	24	112	6,890
June	540	36	217	12,900
July	225	22	73.5	4,520
August	103	17	38.8	2,390
September	168	18	49.1	2,920
October	83	21	42.8	2,630
November	44	21	28.7	1,710
December	.....	.....	17.2	1,060
Mean Yearly	540	.....	56.9	42,200

a—Discharge estimated Jan. 1, to Mar. 5, and Dec. 20 to 31, 1910.
b—Discharge estimated Jan. 1 to Mar. 20, and Nov. and Dec., 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286, and 303.

SMITH RIVER.

Observation Station Located in Sec. 35, T. 9 N., R. 2 E., at Truly, Mont.

Established in 1905.
Elevation of Station about 3,400 feet.
Elevation of Head Waters, 9,000 feet.
Rainfall observed at Fort Logan, Mont.
Drainage Area, 2,080 square miles.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
March, 7–31	173	76	135	.065	6,690	.06
April	140	86	109	.052	6,490	.06
May	224	86	149	.072	9,160	.08
June	534	200	336	.162	20,000	.18
July	300	86	154	.074	9,470	.08
August	173	40	74.6	.036	4,590	.04
September	44	26	31.7	.015	1,890	.02
October	126	44	67.3	.032	4,140	.04
November	98	40	83.3	.040	4,960	.04
December	140	56	86.5	.042	5,320	.05
Total Recorded	.....	.....	.....	.....	72,700	.65
Monthly Flow for the Year of 1906:						
March, 24–31	660	163	434	.209	6,890	.06
April	559	242	331	.159	19,700	.18
May	863	207	392	.188	24,100	.22
June	1,250	712	974	.468	58,000	.52
July	702	76	322	.155	19,800	.18
October	117	86	107	.051	6,580	.06
November, 1–16	126	111	116	.056	3,680	.03
Total Recorded	.....	.....	.....	.....	139,000	1.25
Monthly Flow for the Year of 1907:						
February, 15–28	1,040	156	502	.242	14,900	.13
March	1,310	140	348	.167	21,400	.19
April	846	224	489	.235	29,100	.26
May	1,620	288	796	.383	48,900	.44
June	4,010	792	1,460	.702	86,900	.78
Total Recorded	.....	.....	.....	.....	201,000	1.80

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246.

Rainfall at Fort Logan: Maximum 19.40 inches in 1878, mean 13.01 inches, years 1870 to 1908 inclusive for the months recorded. Many years are only partially complete, 1905 probably had the minimum rainfall.

Data compiled from U. S. Irrigation Investigation Water-rights decreed on stream: N. Fk., 6,039 inches=151 sec.-ft., from 1873 to 1887; S. Fk., 590=15 sec.-ft., of date 1881, and 1882.

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SUN RIVER (N. FORK).

Observation Station Located in Sec. 34, T. 21 N., R. 7 W., 12 Miles Northwest of Augusta, Mont.

Established in 1889—(See note).
Elevation of Station, 4,300 feet.
Elevation of Head Waters, 8,000 feet.
Drainage Area, 634 square miles.
Character of Drainage Basin: The greater part is mountainous above the station.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1889:				
August, 5-31	221	200	213	13,100
September	260	200	214	12,700
October	200	200	200	12,300
November	200	180	191	11,400
December	...	...	a175	10,800
Monthly Flow for the Year of 1890:				
January	.....	.....	a175	10,800
February	.....	.....	a175	9,710
March	.....	.....	a175	10,800
April	1,580	160	371	22,000
May	4,085	1,990	2,804	172,000
June	4,000	1,850	2,342	140,000
July	2,440	450	961	59,100
August	480	315	371	22,800
September	365	260	304	18,100
October	480	240	315	19,400
November	390	275	322	19,200
December	340	240	267	16,400
Total Recorded	...	...	715	520,000
Monthly Flow for the Year of 1905:				
March	199	161	170	10,400
April	672	125	282	16,800
May	2,100	422	1,119	68,800
June	4,070	1,185	2,303	137,000
July	1,380	477	823	50,600
August	537	239	356	21,900
September	259	199	230	13,700
October	199	199	199	12,200
November, 1-26	199	161	165	9,826
December, 24-31	281	281	281	4,460
Total Recorded	...	...	...	345,700
Monthly Flow for the Year of 1906:				
April	925	225	493	29,300
May	1,790	755	1,120	68,900
June	2,320	1,020	1,470	87,500
July	1,020	335	609	37,400
August	485	225	315	19,400
September	335	225	263	15,600
October	430	195	257	15,800
November	1,550	335	519	30,900
December	430	335	360	22,100
Total Recorded	...	...	...	327,000
Monthly Flow for the Year of 1907:				
January	...	...	a230	14,100
February	...	...	a421	23,400
March	420	150	199	12,200
April	1,360	180	596	35,500
May	5,260	585	2,440	150,000
June	6,530	2,950	4,630	276,000
July	4,800	1,470	2,780	171,000
August	1,360	585	818	50,300
September	525	370	434	25,800
October	370	285	330	20,300
November	285	210	263	15,600
December	245	180	228	14,000
Total Recorded	6,530	150	1,110	808,000
Monthly Flow for the Year of 1908:				
March, 11-31	285	210	238	9,910
April	2,080	180	856	50,900
May	3,420	1,360	2,320	143,000
June	d15,000	2,420	5,710	340,000

SUN RIVER (N. FORK)—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
July	2,720	509	1,540	94,700
August	509	365	418	25,700
September	457	365	395	23,500
October	409	365	372	22,900
November	409	365	377	22,400
December, 1–20	409	409	409	16,200
Total Recorded	...	...	...	739,000
Monthly Flow for the Year of 1909:				
April	375	215	246	14,600
May	4,720	260	1,740	107,000
June	7,030	3,350	5,050	300,000
July	3,650	980	1,950	120,000
August	1,260	480	742	45,600
September	480	330	427	25,400
October	330	290	317	19,500
November	1,070	290	682	40,600
Total Recorded	.....	...	.....	673,000
Monthly Flow for the Year of 1910:				
January	.....	...	b400	24,600
February	.....	...	b375	20,800
March	1,350	355	b579	35,600
April	4,340	450	1,900	113,000
May	5,040	2,350	3,190	196,000
June	3,110	1,400	1,960	116,000
July	1,550	450	831	51,100
August	400	275	315	19,400
September	275	240	250	14,900
October	735	240	320	19,700
November	450	315	365	21,700
December	...	275	b304	18,700
Total Recorded	5,040	...	901	652,000
Monthly Flow for the Year of 1911:				
January	..	...	c250	15,400
February	500	250	c420	23,300
March	600	330	c454	27,900
April	1.550	370	732	43,600
May	4,340	1,350	2,520	155,000
June	5,690	2,320	3,930	234,000
July	2,320	560	1,240	76,200
August	710	340	518	31,900
September	630	340	400	23,800
October	495	300	380	23,400
November	410	280	c331	19,700
December	...	...	c275	16,900
Total Recorded	5.690	...	954	691,000
Mean Monthly Flow for the Period of Record:				
January	.....	...	264	16,200
February	.....	.....	348	19,300
March	1,350	150	292	18,000
April	4,340	125	684	40,700
May	5,360	260	2,160	133,000
June	d15,000	1,020	3,420	204,000
July	4,800	335	1,340	82,400
August	1,360	200	452	27,800
September	630	199	324	19,300
October	735	195	299	18,400
November	1,550	161	357	21,200
December	.....	...	282	17,300
Mean Yearly	.....	...	852	618,000

a—Estimated.
b—Estimated January 1 to March 12, and December 22 to 31, 1910.
c—Estimated January 1 to March 5, and November 14 to December 31, 1911.
d—Water over gage June 6–8, 1908. Discharge estimated from high water marks.

Note—This station was discontinued Dec. 31, 1890 and re-established Oct. 31, 1903. During 1903 and 1904 no regular observer could be obtained, and the following discharge measurements were made: Nov. 1, 1903, 453 sec.-ft.; July 8, 1904, 1,420 sec.-ft.; July 9, 1904 ,1,490 sec.-ft.; July 19, 1904, 760 sec.-ft.; Sept. 8, 1904, 269 sec.-ft.; Nov. 12, 1904, 158 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 99, 130, 172, 208, 246, 266, 286 and 306; U. S. G. S. Annual Reports, 11 part 2, 12 part 2, 13 part 3, and 20 part 4.

SUN RIVER.

Observation Station Located in N. E. ¼ Sec. 34, T. 21 N., R. 1 W., at Sun River, Mont.

Established in 1905.

Elevation of Station, 3,500 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 1,420 square miles.

Character of Drainage Basin: Head waters in mountains: and irrigated valleys and bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1905:				
August—b	323	180	239	14,700
September—b	137	80	110	6,545
October	288	80	224	13,770
November	272	256	259	15,410
December	272	225	259	15,920
Total Recorded	...	...	...	66,300
Monthly Flow for the Year of 1906:				
January (1–11; 30–31)	272	238	251	6,470
February	428	238	269	14,900
March (1–10; 28–31)	560	238	317	8,800
April	1,210	238	516	30,700
May	2,730	658	1,310	80,600
June	3,600	1,000	1,730	103,000
July	938	222	533	32,800
August	386	82	190	11,700
September	238	47	137	8,150
October	272	175	207	12,700
November	1,700	206	837	49,800
Total Recorded	...	...	...	360,000
Monthly Flow for the Year of 1907:				
January—a	...	...	400	24,600
February—a	...	...	750	41,700
March	530	410	463	28,500
April	1,120	745	947	56,400
May	5,920	745	2,860	176,000
June	8,850	2,920	5,210	310,000
July	6,200	1,310	3,250	200,000
August	1,400	395	747	45,900
September	523	340	376	22,400
October	355	245	301	18,500
November	350	255	329	19,600
December	475	350	412	25,300
Total Recorded	8,850	...	1,340	969,000
Monthly Flow for the Year of 1908:				
January	1,790	231	457	28,100
March	124	89	102	6,270
April	2,800	100	736	43,800
May	4,390	788	2,380	146.000
June	17,400	2,930	7,290	434,000
July	2,930	882	1,870	115,000
August	965	325	522	32,100
September	645	375	495	29,500
October	645	400	555	34.100
November	560	350	468	27,800
December	425	280	344	21.200
Total Recorded	...	...	...	918,000
Monthly Flow for the Year of 1909:				
March	729	395	534	32,800
April	620	395	468	27,800
May	7,800	620	2,770	170,000
June	12,000	4,200	7,800	464,000
July	10,600	1,000	2,910	179,000
August	1,740	385	756	46,500
September	1,030	385	574	34,200
October	530	430	462	28,400
November	1,060	460	843	50,200
December	970	610	787	48,400
Total Recorded	...	...	...	1,080,000

SUN RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
Monthly Flow for the Year of 1910:				
January--a	.....	...	600	37,000
February—a	.....	...	550	30,500
March—b	1,380	660	979	60,200
April	4,320	635	1,980	118,000
May	4,600	2,080	3,260	200,000
June	2,610	1,100	1,770	105,000
July	1,380	165	589	36,200
August	180	100	115	7,070
September	435	160	319	19,000
October	660	340	482	29,600
November	660	435	558	33,200
December	560	410	493	30,300
Total Recorded	..	...	974	706,000
Monthly Flow for the Year of 1911:				
January—c	.....	...	350	21,500
February—c	.....	...	500	27,800
March—c	.....	...	572	35,200
April	2,310	580	993	59,100
May	4,780	1,500	2,620	161,000
June	5,940	2,510	4,310	256,000
July	2,510	310	908	55,800
August	710	250	398	24,500
September	650	350	478	28,400
October	900	440	538	33,100
November—c	800	240	473	28,100
December—c	...	...	400	24,600
Total Recorded	5,940	...	1,040	755,000
Mean Monthly Flow for the Period of Record:				
January	.....	...	411	25,300
February	.....	...	517	28,700
March	1,380	89	494	30,400
April	4,320	100	940	55,900
May	7,800	620	2,530	156,000
June	17,400	1,000	4,680	278,000
July	10,600	165	2,010	124,000
August	1,740	82	424	26,100
September	1,630	47	356	21,200
October	900	80	396	24,400
November	1,700	206	538	32,000
December	970	...	449	27,600
Mean Yearly	17,400	47	1,140	830,000

a—Estimated.

b—Mean for part of the month taken as mean for the whole.

c—Estimated January 1 to March 24, and November 17 to December 31, 1911.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 172, 208, 246, 266, 286 and 306.

SUN RIVER, NEAR GREAT FALLS.

Established in 1897.

Drainage Area, 1,930 square miles.

Station 10 miles above mouth of Sun River. Gage heights are given for July 11 to October 30, 1897, in U. S. G. S. Water Supply Paper 15, but a rating was not obtained.

The following measurements of discharge were made:

July 4, 1897 .....2,108 second-feet
August 28, 1897 ..... 362 second-feet

WILLOW CREEK.

Observation Station Located in S. E. ¼ Sec. 27, T. 27 N., R. 7 W., Near Augusta, Mont.

Established in 1905.
Elevation of Station, 4,000 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 89 square miles.
Character of Drainage Basin: Mountains and irrigated valley land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
June, 8-30	103	27	58.1	2,650
July	72	9	25.8	1,590
August	53	12	18.7	1,150
September	12	3	7.7	458
October	8	3	4.8	295
November	9	3	6.2	369
December	8	3	5.6	344
Total Recorded	..	..	...	6,860
Monthly Flow for the Year of 1906:				
January	9	7	7.3	449
February	9	5	7.4	411
March	24	4	8.8	541
April	19	7	10.0	595
May	94	4	16.4	1,010
June	53	10	30.5	1,810
July	10	5	6.6	406
August	24	5	8.4	516
September	11	7	9.1	542
October	13	6	7.9	486
November	14	7	10.1	601
December	21	8	11.5	707
Total Recorded	94	4	11.2	8,070
Monthly Flow for the Year of 1907:				
January	8	6	7	430
February	260	6	44.5	2,470
March	39	17	25.3	1,560
April	33	23	27.7	1,650
May	99	33	65.1	4,000
June	227	52	111	6,600
July	134	37	71.9	4,420
August	37	17	24.2	1,490
September	19	13	16.0	952
October	17	10	11.8	726
November	14	8	11.0	655
December	14	6	9.8	602
Total Recorded	260	6	35.4	25,600
Monthly Flow for the Year of 1908:				
January	8	6	6.74	414
February	10	5	6.45	371
March	18	5	10.1	621
April	10	7	8.27	492
May	194	8	40.3	2,480
June	564	83	240	14,300
July	82	21	45.9	2,820
August	25	15	19.1	1,170
September	15	9	11.1	660
October	16	11	14.2	873
November	20	13	15.0	893
December	15	8	11.3	695
Total Recorded	564	5	35.7	25,800
Monthly Flow for the Year of 1909:				
January	240	7.2	24.4	1,500
February	14.2	8.4	10.0	555
March	19.5	5.0	11.1	682
April	27	9.7	12.4	738
May	125	16.0	58.6	3,600
June	488	83	235	14,000
July	320	44	90.8	5,580
August	76	33	48.3	2,970
September	70	24	34.8	2,070
October	24	18	21.9	1,350

WILLOW CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
November	34	13	22.6	1,340
December	21	13	16.0	984
Total Recorded	488	5.0	48.8	35,400
Monthly Flow for the Year of 1910:				
January	22	9.3	12.5	769
February	23	8.8	10.8	600
March	275	10	47.6	2,930
April	41	22	30.8	1,830
May	32	11	18.9	1,160
June	10	2.4	5.42	323
July	2.4	0.0	1.30	80
August	1.2	.8	1.06	65
September	5.6	1.7	3.04	181
October	7.6	5.6	6.15	378
November	8.8	6.1	7.05	420
December	6.5	5.0	6.15	378
Total Recorded	275	0.0	13.1	9,110
Monthly Flow for the Year of 1911:				
January	4.6	3.0	3.80	234
February	4.3	3.0	3.79	210
March	16	3.0	8.15	501
April	11	6.5	8.19	487
May, 1–14	12	6.5	8.79	244
Mean Monthly Flow for the Period of Record:				
January	240	3.0	10.3	633
February	269	3.0	13.8	766
March	275	3.0	18.5	1,140
April	41	6.5	16.2	964
May	194	4.0	37.0	2,280
June	564	2.4	116	6,900
July	320	0.0	40.4	2,480
August	76	.8	20.0	1,230
September	70	1.7	13.6	809
October	24	3.0	11.1	682
November	34	3.0	12.0	714
December	21	3.0	10.1	621
Mean Yearly	564	0.0	26.6	19,200

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246, 266, 286 and 306.

SOUTH FORK OF SUN RIVER.

Observation Station Located in Sec. 11, T. 20 N., R. 6 W., at Augusta, Montana.

Established in 1904—(See note).

Elevation of Head Waters, 7,000 feet.

Drainage Area, 154 square miles.

Character of Drainage Basin: Mountains and irrigated valley land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
March	46	29	39.4	2,420
April	42	29	34.2	2,040
May	160	11	56.4	3,470
June	585	120	295	17,600
July	250	29	85.5	5,260
August	250	7	43.4	2,670
September	14	7	9.4	559
October	29	4	18.0	1,110
November, 1–21	29	4	16.7	696
Total Recorded	.....	.....	.....	35,800

SOUTH FORK OF SUN RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
February	53	30	41.1	2,280
March	69	53	63.8	3,920
April	53	23	30.8	1,830
May	625	18	119	7,320
June	625	95	277	16,500
July	78	17	32.1	1,970
August	41	3	15.6	959
September	31	23	26.2	1,560
October	31	23	25.7	1,580
November	33	25	28.5	1,700
December	42	25	28.4	1,750
Total Recorded	.....	.....	.....	41,400
Monthly Flow for the Year of 1907:				
January	.....	.....	x 20.0	1,230
February	.....	.....	x 97.3	5,400
March	75	46	65.0	4,000
April	113	75	93.1	5,540
May	523	111	292	18,000
June	1,810	153	552	32,800
July	403	111	205	12,600
August	111	48	72.7	4,470
September	48	40	44.8	2,670
October	48	33	39.0	2,400
November	33	33	33.0	1,960
December	33	.....	x 26.3	1,620
Total Recorded	1,810	.....	.....	92,700
Monthly Flow for the Year of 1908:				
April	33	16	28.9	1,720
May	766	2	172	10,600
June	4,300	240	1,280	76,200
July	217	51	107	6,580
August	83	40	49.1	3,020
September	60	33	41.3	2,460
October	99	51	76.2	4,690
November, 1–12	76	30	61.2	1,460
Total Recorded	.....	.....	.....	107,000
Monthly Flow for the Year of 1909:				
March, 14–31	77	37	49.2	1,760
April	44	32	34.7	2,060
May	1,266	44	394	24,200
June	3,040	243	1,220	72,600
July	475	138	259	15,900
August	270	76	111	6,820
September	336	76	114	6,780
October	76	76	76	4,670
November	76	76	76	4,520
Total Recorded	.....	.....	.....	139,000
Monthly Flow for the Year of 1910:				
January	.....	.....	a50.0	3,070
February	.....	.....	a50.0	2,780
March	81	63	a77.9	4,790
April	81	63	71.4	4,250
May	81	21	57.1	3,510
June	21	2	11.9	708
July	13	0.0	2.57	158
August	2	.3	1.00	61
September	32	4.2	17.8	1,060
October	46	32	37.9	2,330
November	46	32	44.6	2,650
December	46	32	43.3	2,660
Total Recorded	.....	.....	38.8	28,000
Monthly Flow for the Year of 1911:				
January	.....	.....	b20.0	1,230
February	.....	.....	b25.0	1,390
March	38	30	b34.0	2,090
April	45	20	29.0	1,730
May	480	30	160	9,840
June	560	160	296	17,600

SOUTH FORK OF SUN RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Min'mum	Mean	Total Acre Feet
July	160	20	66.1	4,060
August	45	20	29.0	1,780
September	65	20	59.2	3,520
October	90	45	62.6	3,850
November	.....	.....	b40.0	2,380
December	.....	.....	b25.0	1,540
Total Recorded	.....	.....	70.5	51,000
Mean Monthly Flow for the Years of 1905-1911:				
January	.....	.....	30.0	1,840
February	.....	.....	53.4	2,970
March	81	29	55.3	3,400
April	113	16	46.0	2,740
May	1,260	2	179	11,000
June	4,300	2	562	33,400
July	475	0.0	108	(6,640
August	270	0.3	46.0	2,830
September	336	4.2	44.7	2,660
October	99	4	47.9	2,940
November	76	4	42.3	2,520
December	.....	.....	30.8	1,890
Mean Yearly	4,300	0.0	104	74,800

x—Estimated for ice period.
a—Estimated Jan. 1, to Mar. 12, 1910.
b—Estimated Jan. 1, to Mar. 23, and Nov. and Dec. 1911.
Note—The only measurement of discharge during 1904 was one of 23.3 sec.-ft. on Dec. 2.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 130, 172, 208, 246, 266, 286 and 306.

FORD CREEK.

Observation Station Located in S. E. ¼ Sec. 31, T. 20 N., R. 8 W., Near Augusta, Mont.
Established in 1906.
Elevation of Station, 4,800 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 18 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1906:						
April (14-30)	16	12	14.9	.828	503	0.52
May	61	12	22.0	1.22	1,350	1.41
June	93	28	47.6	2.64	2,830	2.94
July	28	12	22.5	1.25	1,380	1.44
August	32	12	15.8	.878	972	1.01
September	16	12	13.1	.728	780	.81
October	16	12	12.8	.716	787	.83
November	48	b 0	22.2	1.23	1,320	1.37
December	21	16	19.2	1.06	1,180	1.22
Total Recorded	..	..	....	...	11,100	....
Monthly Flow for the Year of 1907:						
January	..	..	10	.556	615	.64
February	19	10	12.6	.700	700	.73
March	19	10	13.1	.728	806	.84
April	34	14	22.3	1.24	1,330	1.38
May	129	19	71.4	3.97	4,390	4.58
June	430	81	142	7.89	8,450	8.80
July	147	30	67.6	3.76	4,160	4.34
August	34	20	24.0	1.33	1,480	1.53
September	22	20	20.4	1.13	1,210	1.26
October	20	12.5	18.6	1.03	1,140	1.19

FORD CREEK—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
November	12.5	12	12.0	.667	714	.74
December	12	12	12.0	.667	738	.77
Total Recorded	430	..	35.5	1.97	25,700	26.80
Monthly Flow for the Year of 1908:						
January	12	12	12.0	.667	738	.77
February	12	5.3	6.59	.366	379	.39
March	8.5	..	5.34	.297	328	.34
April	24	5.3	14.5	.806	863	.90
May	201	23	51.8	2.88	3,190	3.32
June	720	60	227	12.6	13,500	14.06
July	60	35	43.7	2.43	2,690	2.80
August	35	21	26.0	1.44	1,600	1.66
September	21	21	21.0	1.17	1,250	1.30
October	21	21	21.0	1.17	1,290	1.35
November	21	21	21.0	1.17	1,250	1.30
December	21	16	17.1	.950	1,050	1.10
Total Recorded	720	..	38.9	2.16	28,100	29.29
Monthly Flow for the Year of 1909:						
January	21	21	21	1.17	1,290	1.35
February	21	21	21	1.17	1,170	1.22
March	21	14	17.4	.967	1,070	1.11
April	24	14	17.1	.950	1,020	1.06
May	152	21	78.5	4.36	4,830	5.03
June	705	129	256	14.2	15,200	15.84
July	123	44	65.4	3.63	4,020	4.18
August	44	26	34.4	1.91	2,120	2.20
September	56	19	25.4	1.41	1,510	1.57
October	19	19	19.0	1.06	1,170	1.22
November	26	13.5	19.1	1.06	1,140	1.18
December	13.5	13.5	13.5	.750	830	.86
Total Recorded	705	13.5	49.0	2.72	35,400	36.82
Monthly Flow for the Year of 1910:						
January	15	11	13.4	.744	824	.86
February	11	11	11.0	.611	611	.64
March	36	11	19.5	1.08	1,200	1.24
April	68	20	39.2	2.18	2,330	2.43
May	55	35	46.1	2.56	2,830	2.95
June	35	27	30.9	1.72	1,840	1.92
July	26	16	18.9	1.05	1,160	1.21
August	16	12	13.3	.739	818	.85
September	25	12	15.9	.883	946	.99
October	16	11	13.9	.772	855	.84
November	12	9.5	10.6	.589	631	.66
December	11	11	11.0	.611	676	.70
Total Recorded	68	9.5	20.3	1.13	14,700	15.34
Monthly Flow for the Year of 1911:						
January	..	..	a10	.556	615	.64
February	..	..	a10	.556	555	.58
March	..	..	a11.3	.628	695	.72
April	28	13	15.4	.856	916	.96
May	107	21	52.5	2.92	3,230	3.37
June	114	47	79.2	4.40	4,710	4.91
July	44	26	32.9	1.83	2,020	2.11
August	26	17	20.0	1.13	1,250	1.30
September	18	13	16.0	.889	952	.99
October	..	..	a13	.722	799	.83
November	..	..	a10	.556	595	.62
December	..	..	a8	.444	492	.51
Total Recorded	114	..	23.2	1.29	16,800	17.54
Mean Monthly Flow for the Years of 1906–1911:						
January	21	..	13.3	.739	818	.85
February	21	5.3	12.2	.678	678	.71
March	36	..	13.3	.739	818	.85
April	68	5.3	21.1	1.17	1,260	1.30

FORD CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
May	201	12	53.7	2.98	3,300	3.44
June	720	27	130	7.22	7,740	8.06
July	147	12	41.8	2.32	2,570	2.68
August	44	12	22.3	1.24	1,370	1.43
September	56	12	18.6	1.03	1,110	1.15
October	21	11	16.4	.911	1,010	1.05
November	48	b 0	15.8	.878	940	.98
December	21	..	13.5	.750	830	.86
Mean Yearly	720	b 0	31.0	1.72	22,400	23.36

a—Estimated January 1 to March 22, and October 1 to December 31, 1911.
b—Entire flow turned in irrigation ditch Nov. 2–3, 1906.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 208, 246, 266, 286 and 306.

SMITH CREEK.

Observation Station Located in N. E. ¼ Sec. 17, T. 19 N., R. 8 W., Near Augusta, Mont.

Established in 1906.
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 26 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1906:						
April (16–30)	45	20	23.9	0.920	711	.51
May	123	20	42.5	1.63	2,610	1.88
June	175	38	75.7	2.90	4,500	3.24
July	31	16	22.1	.850	1,360	.98
August	31	12	15.5	.596	953	.69
September	12	6	9.4	.361	559	.40
October	20	12	13.0	.500	799	.58
November	31	12	18.6	.716	1,110	.80
December	20	12	13.2	.508	812	.59
Total Recorded	..	..	....	....	13,400	...
Monthly Flow for the Year of 1907:						
January	16	12	13.3	.512	818	0.59
February	25	12	15.7	.604	872	.63
March	31	12	18.9	.727	1,160	.84
April	45	25	40.2	1.55	2,390	1.73
May	175	31	93.3	3.59	5,740	4.14
June	806	61	171	6.58	10,200	7.34
July	132	32	62.8	2.42	3,860	2.79
August	32	21	23.3	.896	1,430	1.03
September	21	17	18.5	.712	1,100	.79
October	13	13	13.0	.500	799	.58
November	13	13	13.0	.500	774	.56
December	13	13	13.0	.500	799	.58
Total Recorded	806	12	41.3	1.59	29,900	21.60
Monthly Flow for the Year of 1908:						
January	13	13	13.0	.500	799	.58
February	13	13	13.0	.500	748	.54
March	17	13	13.4	.515	824	.59

SMITH CREEK—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
April	21	13	16.2	.623	964	.70
May	453	21	96.8	3.72	5,950	4.29
June	780	70	230	8.85	13,700	9.87
July	54	22	36.9	1.42	2,270	1,64
August	34	17	19.1	.735	1,170	.85
September	28	14	17.5	.673	1,040	.75
October	57	17	37.6	1.45	2,310	1.67
November	25	20	22.3	.858	1,330	.96
December	20	12	15.0	.577	922	.67
Total Recorded	780	12	44.2	1.70	32,000	23.11
Monthly Flow for the Year of 1909:						
January	18.2	13.5	14.3	.550	879	.63
February	13.5	10.2	12.6	.485	700	.50
March	13.5	7.0	9.71	.374	597	.43
April	18.2	10.2	14.4	.554	857	.62
May	229	18.2	116	4.46	7,130	5.14
June	468	109	255	9.81	15,200	10.94
July	195	42	68.6	2.64	4,220	3,04
August	49	26	35.3	1.36	2,170	1.57
September	81	21	33.7	1.30	2,010	1.45
October	21	10.0	17.3	.665	1,060	.77
November	27	10.0	16.4	.631	976	.70
December	17	10.0	13.3	.512	818	.59
Total Recorded	468	7.0	50.6	1.95	36,600	26.38
Monthly Flow for the Year of 1910:						
January	13	10	10.4	.400	640	.461
February	10	8	9.93	.382	551	.398
March	63	13	34.0	1.31	2,090	1.51
April	63	25	45.0	1.73	2,680	1.93
May	48	30	41.0	1.58	2,520	1.82
June	30	16	23.7	.912	1,410	1.02
July	16	10	12.8	.492	787	.567
August	16	10	10.2	.392	627	.452
September	36	13	19.6	.753	1,170	.840
October	20	15	16.3	.627	1,000	.723
November	15	14	14.7	.566	875	.632
December	14	13	13.5	.519	830	.598
Total Recorded	63	8	21	.805	15,200	10.95
Monthly Flow for the Year of 1911:						
January	...	....	a10.0	.385	615	.44
February	...	....	a 8.0	.308	444	.32
March	15	6	a 9.5	.365	584	.42
April	47	15	21.0	.808	1,250	.90
May	414	34	98.8	3.80	6,080	4.38
June	264	47	110.	4.23	6,550	4.72
July	47	15	28.5	1.10	1,750	1.27
August	15	15	15.0	.577	922	.67
September	47	15	28.3	1.09	1,680	1.22
October	34	19	23.3	.896	1,430	1.03
November	19	15	15.9	.612	946	.68
December	12	7.5	8.52	.328	524	.38
Total Recorded	414	...	31.5	1.21	22,800	16.43
Mean Monthly Flow for the Years of 1906–1911:						
January	18.2	....	12.2	.469	750	.54
February	25	....	11.8	.454	655	.47
March	63	6.0	17.1	.658	1,050	.76
April	63	10.2	27.0	1.04	1,610	1.16
May	453	18.2	81.4	3.13	5,010	3.61
June	806	16	144	5.54	8,570	6.18
July	195	10	38.6	1.48	2,370	1.71

SMITH CREEK—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
August	49	10	19.7	.758	1,210	.87
September	81	6	21.2	.816	1,260	.91
October	57	10	20.4	.785	1,250	.90
November	31	10	16.8	.647	1,000	.72
December	20	7.5	12.8	.492	787	.57
Mean Yearly	806	6	35.2	1.36	25,500	18.40

a—Estimated Jan. 1, to Mar. 10, 1911.

Note—An underflow possible affects the flow past the Smith Creek gage, causing it to be less per square mile than past the station on Ford Creek.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 208, 246, 266, 286 and 306.

BELT CREEK.

Observation Station Located in Sec. 18, T. 20 N., R. 7 E., near Belt, Mont.

Established in 1905.

Elevation of Station, 3,300 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 566 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
March, 18–31	7	5	6.3	175
April	10	5	7.3	434
May	90	7	24.8	1,520
June	705	109	341	20,300
July	243	27	109	6,700
August—a	36	0	8.2	504
Total Recorded	.....	.....	.....	29,600
Monthly Flow for the Year of 1906:				
March, 26–31	27	27	27.0	321
April	30	5	16.0	952
May	429	30	150	9,220
June	1 370	276	818	48,700
July	655	46	231	14,200
August	46	1	16.3	1,000
September	12	0	2.3	137
Octobe.	0	0	0	0
November	7	0	3.1	105
Total Recorded	.....	.....	.....	74,600

a—Creek dry for the rest of year.

Station discontinued Jan. 1, 1907.

The above results are only estimates, as gage heights were not very accurate.

Reference for daily flow: U. S. G. S. Water Supply papers 172 and 208.

HIGHWOOD CREEK.

Observation Station Located in Sec. 5, T. 20 N., R 8 E., Near Highwood, Mont.

Established in 1905.
Elevation of Station, 4,000 feet.
Elevation of Head Waters, 6,000 feet.
Drainage Area, 55 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
March, 19–31	7	6	6.5	168
April	8	6	6.9	411
May	14	6	9.4	578
June	416	10	57.7	3,430
July	20	6	8.9	547
August	6	0	1.5	92
September	0	0	0	0
October	4	0	.3	18
November	5	4	5.0	298
December	6	5	5.3	326
Total Recorded	.....	.....	.....	5,870
Monthly Flow for the Year of 1906:				
March, 16–31	10	6	7.4	235
April	13	8	9.8	583
May	62	6	12.3	756
June, 1–5, 11–30—a	.....	44	132	6,540
July	68	7	22.0	1,350
Total Recorded	.....	.....	.....	9,460

a—June 6–10, 1906, stage too high to estimate.
Discontinued July 31, 1906.
Reference for daily flow: U. S. G. S. Water Supply papers 172 and 208.

MARIAS RIVER.

Observation Station Located in Sec. 20, T.31 N., R. 2 W., 8 Miles South of Shelby, Mont.

Established in 1902.
Elevation of Station, about 3,200 feet.
Elevation of Head Waters, about 8,500 feet.
Drainage Area, 2,610 square miles.
Character of Drainage Basin: Timbered mountains; benchlands, and valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
April, 4–30	.....	.....	468	.18	25,100	.18
May	5,235	600	4,764	1.83	293,000	2.11
June	6,633	2,047	3,469	1.33	206,000	1.48
July	16,313	1,190	3,980	1.52	245,000	1.75
August	1,402	333	654	.25	40,200	.29
September	600	373	463	.18	27,600	.20
October	480	425	425	.16	26,100	.18
November	720	373	518	.20	30,800	.22
December	660	480	563	.22	34,600	.25
Total Recorded	.....	.....	1,700	.64	928,000	6.66
Monthly Flow for the Year of 1903:						
January	1,240	408	968	.371	59,500	.431
February	1,600	460	934	.358	51,900	.373
March	7,400	895	1,563	.589	96,100	.689

MARIAS RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
April	6,800	518	1,516	.581	90,200	.651
May	3,800	1,100	2,582	.989	159,000	1.140
June	7,800	3,600	5,467	2.094	325,000	2.330
July	3,800	800	a1,993	.764	122,000	.882
August	800	510	a 671	.257	41,300	.296
September	1,240	460	a 618	.237	36,800	.264
October	895	582	738	.282	45,400	.325
November	2,460	408	1,048	.401	62,400	.451
December	2,200	654	1,506	.577	92,600	.668
Total Recorded	7,800	408	1,634	.626	1,180,000	8,504
Monthly Flow for the Year of 1904:						
January	1,280	900	b 900	.345	55,300	.398
February	.....	.....	b 800	.307	46,000	.331
March	.....	.....	b 800	.307	49,200	.354
April	8,560	800	2,457	.941	146,000	1.050
May	4,960	1,980	2,848	1.091	175,000	1.258
June	3,760	1,240	2,495	.956	148,000	1.067
July	1,605	435	871	.334	53,600	.385
August	490	290	367	.141	22,600	.162
September	335	205	246	.094	14,700	.105
October	265	185	204	.078	12,500	.090
November	185	150	168	.064	10,000	.071
December	.....	.....	b 150	.057	9,220	.063
Total Recorded	.....	.....	1,017	.393	742,000	5.337
Monthly Flow for the Year of 1905:						
May	3,940	1,410	2,114	.810	130,000	.934
June	2,290	1,170	1,585	.607	94,300	.677
July	1,690	450	870	.333	53,500	.384
August, 1–22	520	198	321	.123	14,000	.101
November	390	215	279	.107	16,600	.119
December	296	250	276	.106	17,000	.122
Total Recorded	.....	.....	.....	.....	325,000	.....
Monthly Flow for the Year of 1906:						
January, 1–22	365	250	278	.106	12,100	.09
March, 27–31	1,020	570	796	.305	7,890	.06
April	920	305	634	.243	37,700	.27
May	2,740	820	1,460	.559	89,800	.64
June	4,090	1,640	2,820	1.08	168,000	1.20
Total Recorded	.....	.....	.....	.....	315,000	.....
Monthly Flow for the Year of 1907:						
May, 20–31	4,340	2,520	3,560	1.36	84,700	.61
June	29,500	2,800	7,160	2.74	426,000	3.06
July	6,520	1,370	2,990	1.14	184,000	1.31
August	1,370	640	1,020	.391	62,700	.45
September	1,250	720	889	.341	52,900	.38
October	720	440	508	.195	31,200	.22
November	500	385	443	.170	26,400	.19
December	385	290	330	.126	20,300	.15
Total Recorded	.....	.....	.....	.....	888,000	.....
Monthly Flow for the Year of 1908:						
January, 1–11	290	250	261	.100	5,690	.04
Monthly Flow for the Year of 1911:						
April, 23–30	2,570	1,560	2,090	.801	33,200	.24
May	6,110	1,830	3,100	1.19	191,000	1.37
June	4,640	2,310	3,390	1.30	202,000	1.45
July	2,310	680	1,150	.441	70,700	.51
August	1,090	540	779	.298	47,900	.34
September	4,360	430	1,850	.709	110,000	.79
October	1,610	830	1,130	.433	69,500	.50
November	870	250	c 427	.164	25,400	.18
December	.....	.....	c 250	.096	15,400	.11
Total Recorded	.....	.....	.....	.....	765,000	.....

MARIAS RIVER—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Mean Monthly Flow for the Period of Record:						
January	1,380	250	713	.273	43,800	.31
February	1,600	.....	867	.332	48,200	.35
March	7,400	.....	1,150	.441	70,700	.51
April	8,560	305	1,490	.571	88,700	.64
May	6,110	600	2,850	1.09	175,000	1.26
June	29,500	1,170	3,770	1.44	224,000	1.61
July	16,300	435	1,980	.750	122,000	.88
August	1,400	198	649	.249	39,900	.29
September	4,360	205	813	.311	48,400	.35
October	1,610	185	601	.230	37,000	.27
November	2,400	150	480	.184	28,600	.21
December	2,200	.....	512	.196	31,500	.23
Mean Yearly	29,500	150	1,320	.506	958,000	6.91

a—Estimated July 12 to 23, and 25 to 31; Aug. 1-17 and 19-31, and Sept. 1 to 10, 1903.
b—Estimated Jan. 19 to 31; Feb., Mar., April 1 to 7; Nov. 20 to 30 and Dec. 1904.
c—Estimated Nov. 12 to Dec. 31, 1911.
Note—The station was discontinued in January, 1908 and re-established in 1911.
A measurement of Marias River near Shelby on Oct. 24, 1901, showed a discharge of 296 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 66, 84, 99, 130, 172, 208, 246 and 306.
Water Rights recorded on stream to May 21, 1903, 13,800 inches or 345 second-feet.

TWO MEDICINE CREEK AT MIDVALE, MONTANA.

Established in 1902.
Drainage Area, 106 square miles.
Gage heights for this station were read from October 17, 1902, to July 4, 1903. The following measurements were made: Oct. 15, 1902, discharge 34 second-feet; Oct. 15, 1902, discharge 47 second-feet.
References: U. S. G. S. Water Supply papers 84 and 99.

TWO MEDCINE CREEK.

Observation Station Located in N. E. ¼ Sec. 2, T. 31 N., R. 9 W., near Family, Mont.
Established in 1907.
Drainage Area, 368 square miles.
Character of Drainage Basin: Mountains and rolling bench lands.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1907:						
April, 26-30	505	420	478	1.30	4,740	0.24
May	2,930	475	1,500	4.08	92,200	4.70
June	7,550	1,640	2,650	7.20	158,000	8.03
July	2,130	455	982	2.67	60,400	3.08
August	425	126	259	.704	15,900	.81
September	320	248	282	.764	16,800	.85
October	225	60	110	.299	6,760	.34
November	60	50	53.0	.144	3,150	.16
December	50	25	40.0	.109	2,460	.13
Total Recorded	.....	.....	.....	.....	360,000	.....

TWO MEDICINE CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1908:						
January	25	.....	19.8	.054	1,220	.06
February	.....	.....	17.0	.046	978	.05
March	82	17	65.2	.177	4,010	.20
April	1,990	82	704	1.91	41,900	2.13
May	2,880	370	1,420	3.86	87,300	4.45
June, 20 days	.....	560	1,800	4.89	71,400	3.64
July	770	230	449	1.22	27,600	1.41
August	283	79	171	.465	10,500	.54
September	163	68	101	.274	6,010	.31
October, 1–17	147	79	112	.304	3,780	.19
Total Recorded	.....	.....	.....	.....	255,000	.....
Monthly Flow for the Year of 1909:						
January, 1–22	65	41	52.5	.143	2,290	.12
April	402	85	156	.424	9,280	.47
May	4,240	190	1,730	4.70	106,000	5.42
June	7,600	1,170	3,340	9.08	199,000	10.12
July	7,810	280	1,130	3.07	69,500	3.54
August	1,170	100	283	.769	17,400	.89
September	100	75	78.8	.214	4,690	.24
October	80	70	76.8	.209	4,720	.24
November, 1–20	375	70	170	.462	6,740	.34
Total Recorded	.....	.....	.....	.....	420,000	.....
Monthly Flow for the Year of 1910:						
January	.....	.....	a 75	.204	4,610	.24
February	.....	.....	a 75	.204	4,170	.21
March	1,160	.....	a 275	.747	16,900	.86
April	1,790	285	940	2.55	55,900	2.84
May	1,500	655	1,010	2.74	62,900	3.16
June	1,040	330	629	1.71	37,400	1.91
July	355	103	188	.511	11,600	.59
August	103	75	85.4	.232	5,250	.27
September	158	75	138	.375	8,210	.42
October	625	225	335	.910	20,600	1.05
November	595	171	a 292	.793	17,400	.88
December	.....	.....	a 100	.272	6,150	.31
Total Recorded	1,790	.....	345	.938	250,000	12.74
Monthly Flow for the Month of 1911:						
January	.....	.....	b 50	.136	3,070	.16
February	.....	.....	b 50	.136	2,780	.14
March	480	50	b 153	.416	9,410	.48
April	1,680	167	609	1.66	36,200	1.85
May	4,140	855	1,380	3.75	84,800	4.32
June	1,950	752	1,260	3.42	75,000	3.82
July	988	135	353	.959	21,700	1.11
August	240	84	153	.416	9,410	.48
September	1,150	84	596	1.62	35,500	1.81
October	452	151	268	.728	16,500	.84
November	.....	.....	b 120	.326	7,140	.36
December	.....	.....	b 90	.244	5,530	.28
Total Recorded	4,140	.....	424	1.15	307,000	15.65
Mean Monthly Flow for the Period of Record:						
January	.....	.....	49.0	.133	3,010	.15
February	.....	.....	47.3	.129	2,630	.13
March	1,160	17	164	.446	10,100	.51
April	1,990	82	597	1.62	35,500	1.81
May	4,240	190	1,410	3.83	86,700	4.42
June	7,600	330	1,950	5.30	116,000	5.91
July	7,310	103	620	1.69	38,100	1.95
August	1,170	75	190	.516	11,700	.59
September	1,150	68	239	.650	14,200	.73
October	525	60	188	.511	11,600	.59
November	595	50	158	.429	9,400	.48
December	.....	25	76.7	.208	4,720	.24
Mean Yearly	7,600	17	474	1.29	344,000	17.51

a—Estimated Jan. 1 to Mar. 19, and Nov. 27 to Dec. 31, 1910.
b—Estimated Jan. 1 to Mar. 7, and Nov. 12 to Dec. 31, 1911.
Note—A measurement on May 23, 1900 gave a discharge of 1,070 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 49, 246, 266, 286 and 306.

BADGER CREEK.

Observation Station Located in N. E. ¼ Sec. 19, T. 31 N., R. 8 W., near Family, Mont.
Established in 1907.
Drainage Area, 224 square miles.
Character of Drainage Basin: Mountains and rolling benchlands.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches Drainage Area
Monthly Flow for the Year of 1907:						
April, 26–30	240	170	217	.969	2,150	0.18
May	1,070	225	595	2.66	36,600	3.07
June	.....	730	1,140	5.09	67,800	5.68
July	930	353	543	2.42	33,400	2.79
August	342	250	284	1.27	17,500	1.46
September	264	231	247	1.10	14,700	1.23
October	231	208	218	.973	13,400	1.12
November, 1–24	208	190	202	.902	9,620	.81
Total Recorded	.....	.....	.....	.....	195,000	.....
Monthly Flow for the Year of 1908:						
April	499	142	251	1.12	14,900	1.25
May	1,160	247	546	2.44	33,600	2.81
September	261	.....	136	.607	8,090	.68
October	204	139	152	.679	9,350	.78
November	132	123	127	.567	7,560	.63
Monthly Flow for the Year of 1909:						
March, 27–31	142	118	130	.580	1,290	.11
April	193	96	126	.562	7,500	.63
May, 1–24	884	220	410	1.83	19,500	1.63
September, 22–30	207	182	185	.826	3,300	.28
October	182	135	145	.647	8,920	.75
November, 1–22	523	135	231	1.03	10,100	.84
Monthly Flow for the Year of 1910:						
January	.....	.....	a 100	.446	6,150	.51
February	.....	.....	a 75	.335	4,160	.35
March	224	132	a 162	.723	9,960	.83
April	835	127	381	1.70	22,700	1.90
May	810	406	553	2.47	34,000	2.85
June	577	b 215	316	1.41	18,800	1.57
July	224	141	174	.777	10,700	.90
August	150	127	136	.607	8,400	.70
September	178	150	162	.723	9,640	.81
October	308	160	212	.946	13,000	1.09
November	277	182	199	.888	11,800	.99
December	.....	.....	a 175	.781	10,800	.90
Total Recorded	835	.....	220	.982	175,000	13.40
Monthly Flow for the Year of 1911:						
January	.....	.....	c 30	.134	1,840	.15
February	.....	.....	c 25	.112	1,390	.12
March	146	.....	c 79	.353	4,860	.41
April	625	132	273	1.22	16,200	1.36
May	1,060	412	650	2.90	40,000	3.34
June	1,120	532	748	3.34	44,500	3.72
July	532	200	304	1.36	18,700	1.59
August	232	160	190	.848	11,700	.98
September	675	160	493	2.20	29,300	2.46
October	500	250	356	1.59	21,900	1.83
November	.....	.....	c 175	.781	10,400	.87
December	.....	.....	c 75	.335	4,610	.39
Total Recorded	1,120	.....	284	1.27	205,000	17.22
Mean Monthly Flow for the Period of Record:						
January	.....	.....	65	.290	4,000	.33
February	.....	.....	50	.223	2,780	.23
March	224	.....	121	.540	7,440	.62
April	835	96	256	1.14	15,200	1.27
May	1,160	220	558	2.49	34,300	2.87
June	.....	215	735	3.28	43,700	3.66
July	930	141	340	1.52	20,900	1.75

BADGER CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
August	342	127	203	.907	12,500	1.05
September	675	150	254	1.13	15,100	1.26
October	500	135	217	.969	13,300	1.12
November	523	123	184	.822	10,900	.92
December	.....	.....	125	.558	7,690	.64
Mean Yearly	.... .	.....	259	1.16	184,000	15.72

a—Estimated Jan. 1 to Mar. 12, and Nov. 26 to Dec. 31, 1910.
b—Estimated.
c—Estimated Jan. 1 to Mar. 31, and Nov. 1 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286, and 306.

CUTBANK CREEK.

Observation Station Located in S. W. ¼ Sec. 1, T. 33 N., R. 6 W., at Cutbank, Mont.
Established in 1905.
Elevation of Station about 3,600 feet.
Elevation of Head Waters, 8,500 feet.
Drainage Area, 971 square miles.
Character of Drainage Basin: Mountains and rolling benchlands.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
August, 4-31	83	17	45.2	.047	2,510	.05
September	20	11	14.5	.015	863	.02
October	155	17	74.0	.076	4,550	.09
November	73	5	45.9	.047	2,730	.05
Total Recorded	.....	.....	.....	.....	10,700	.....
Monthly Flow for the Year of 1906:						
April	290	45	115	.118	6,840	.13
May	1,170	87	283	.292	17,400	.34
June	815	250	436	.449	25,900	.50
July	250	62	142	.146	8,730	.17
August	330	45	84.4	.087	5,190	.10
September	125	45	65.9	.068	3,920	.08
October	250	45	74.8	.077	4,600	.09
November	520	62	216	.222	12,900	.25
December	.....	.....	a200	.206	12,300	.24
Total Recorded	.....	.....	.....	.....	97,800	.....
Monthly Flow for the Year of 1907:						
January	.....	.....	b200	.206	12,300	.24
February	.....	.....	b690	.710	38,300	.74
March	.....	.....	b260	.268	16,000	.31
April	1,140	248	410	.422	24,400	.47
May	1,090	285	561	.578	34,500	.67
June	4,560	569	1,090	1.12	64,900	1.25
July	990	248	536	.552	33,000	.64
August	248	84	165	.170	10,100	.20
September	322	125	205	.212	12,200	.24
October	180	60	89.0	.092	5,470	.11
November	125	44	58.6	.060	3,490	.07
December	.....	.....	b 53.0	.055	3,260	.06
Total Recorded	4,560	.....	360	.370	258,000	5.00

CUT BANK CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1908:						
April	520	105	261	.269	15,500	.30
May	815	255	490	.505	30,100	.58
June	7,310	503	1,630	1.68	97,000	1.87
July	503	197	381	.392	23,400	.45
August	168	65	106	.109	6,520	.13
September	138	45	73.4	.076	4,370	.08
October	138	94	103	.106	6,330	.12
November	230	94	141	.145	8,390	.16
December	.....	.....	125	.129	7,690	.15
Total Recorded	.....	.....	.....	.....	199,000	.....
Monthly Flow for the Year of 1909:						
April	352	113	198	.204	11,800	.23
May	1,810	160	728	.750	44,800	.86
June	1,350	518	982	1.01	58,400	1.13
July	2,330	160	532	.548	32,700	.63
August	708	77	199	.205	12,200	.24
September	77	52	58.7	.060	3,490	.07
October	77	52	52.8	.054	3,250	.06
November	432	77	242	.249	14,400	.28
Total Recorded	.....	.....	.....	.....	181,000	.....
Monthly Flow for the Year of 1910:						
January	.....	.....	c150	.154	9,220	.18
February	.....	.....	c150	.154	8,330	.16
March	772	148	c555	.366	21,800	.42
April	650	148	292	.301	17,400	.34
May	650	303	444	.457	27,300	.53
June	543	194	363	.374	21,600	.42
July	194	57	114	.118	7,010	.14
August	57	39	42.5	.044	2,610	.05
September	110	39	75.4	.078	4,490	.09
October	303	95	207	.213	12,700	.25
November	246	.....	c117	.120	6,960	.13
December	.....	.....	c 35	.036	2,150	.04
Total Recorded	.....	.....	196	.202	142,000	2.75
Monthly Flow for the Year of 1911:						
January	.....	.....	d 16	.016	984	.02
February	.....	.....	d 16	.016	889	.02
March	860	75	d231	.238	14,200	.27
April	374	102	222	.228	13,200	.25
May	1,700	260	512	.528	31,500	.61
June	2,680	412	728	.750	43,300	.84
July	630	98	210	.216	12,900	.25
August	195	50	116	.119	7,100	.14
September	949	52	298	.307	17,700	.34
October	190	90	134	.138	8,200	.16
November	.....	.....	d 75	.077	4,460	.09
December	.....	.....	d 50	.052	3,070	.06
Total Recorded	2,680	.....	218	.224	158,000	3.05
Mean Monthly Flow for the Period of Record:						
January	.....	.....	122	.126	7,500	.15
February	.....	.....	285	.294	15,800	.31
March	860	.....	282	.290	17,300	.33
April	1,140	45	250	.258	14,900	.29
May	1,810	87	503	.518	30,900	.60
June	7,310	194	872	.898	51,900	1.00
July	2,330	57	319	.329	19,600	.38
August	708	17	108	.111	6,640	.13
September	949	11	113	.116	6,720	.13
October	303	17	105	.108	6,460	.12
November	520	5	128	.122	7,620	.14
December	.....	.....	92.6	.095	5,690	.11
Mean Yearly	7,310	5	265	.273	191,000	3.69

a—Estimated.
b—Estimated from several gage heights during frozen periods.
c—Estimated Jan. 1 to Mar. 7, and Nov. 20 to Dec. 31, 1910.
d—Estimated Jan. 1 to Mar. 16, and Nov. 8 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246, 266, 286 and 306.

BIRCH CREEK.

Observation Station Located in Sec. 28, T. 29 N., R. 8 W., 12 Miles Northwest of Dupuyer, Montana.

Established in 1907.
Drainage Area, 155 square miles.
Character of Drainage Basin: Mountains and rolling benchlands.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1907:						
July, 25–31	288	250	268	1.73	3,720	0.45
August	250	166	189	1.22	11,600	1.41
September	177	.....	150	.968	8,930	1 08
October	133	116	122	.787	7,500	.91
November	116	109	111	.716	6,600	.80
December, 1–14	109	109	109	.703	3,030	.37
Monthly Flow for the Year of 1908:						
March, 15–31	116	85	92.4	.596	3,120	.38
April	355	85	167	1.08	9,940	1.20
May	1,319	177	390	2.52	24,000	2.90
July, 23–31	211	133	169	1.09	3,020	.36
August	147	109	126	.813	7,750	.94
September	281	95	150	.968	8,930	1.08
Monthly Flow for the Year of 1909:						
July	1,680	210	427	2.75	26,300	3.17
August	457	131	218	1.41	13,400	1.63
September	141	90	121	.781	7,200	.87
October	113	82	93.9	.606	5,770	.70
November	162	82	103	.664	6,130	.74
December	.....	.....	a85	.549	5,230	.63
Total Recorded	.....	.....	.....	.....	64,000	.....
Monthly Flow for the Year of 1910:						
January	.....	.....	b90	.581	5,530	.67
February	.....	.....	b 90	.581	5,000	.60
March	193	90	b116	.748	7,130	.86
April	409	100	239	1.54	14,200	1.72
May	430	200	287	1.85	17,600	2.13
June	286	122	193	1.25	11,500	1.40
July	117	88	95.8	.618	5,890	.71
August	88	71	80.2	.517	4,930	.60
September	128	90	111	.716	6,600	.80
October	149	103	126	.813	7,750	.94
November	134	.....	b114	.735	6,780	.82
December	.....	.....	b 85	.548	5,230	.63
Total Recorded	430	71	136	.875	98,100	11.88
Monthly Flow for the Year of 1911:						
January	.....	.....	c 50	.323	3,070	.37
February	.....	.....	c 35	.226	1,940	.24
March	.....	.....	c 55	.355	3,380	.41
April	375	92	159	1.03	9,460	1.15
May	750	202	399	2.57	24,500	2.96
June	728	240	440	2.84	26,200	3.17
July	452	148	209	1.35	12,900	1.56
August	168	109	135	.871	8,300	1.00
September	533	109	300	1.94	17,900	2.16
October	240	148	201	1.30	12,400	1.50
November	148	89	127	.819	7,560	.91
December	148	100	c105	.677	6,460	.78
Total Recorded	750	.....	186	1.20	134,000	16.21
Mean Monthly Flow for the Period of Record:						
January	.....	.....	70.0	.452	4,300	.52
February	.....	.....	62.5	.403	3,470	.42
March	.....	.....	86.9	.560	5,340	.65
April	409	85	188	1.21	11,200	1.35
May	1,310	177	359	2.32	22,100	2.68
June	.....	122	316	2.04	18,800	2.28
July	1,680	88	240	1.55	14,800	1.79
August	457	71	150	.968	9,220	1.12

BIRCH CREEK—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	533	90	166	1.07	9,880	1.19
October	240	82	138	.891	8,480	1.03
November	162	82	114	.736	6,780	.82
December	.....	.....	94.1	.607	5,790	.70
Mean Yearly	.....	.....	165	1.06	120,000	14.55

a—Estimated.
b—Estimated Jan. 1 to Mar. 12, and Nov. 27–Dec. 31, 1910.
c—Estimated Jan. 1, to Mar. 31, and Dec. 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.

DUPUYER CREEK.

Observation Station Located in S. W. ¼ Sec. 10, T. 28 N., R. 7 W., at Dupuyer, Mont.

Established in 1908.
Elevation of Station, 4,110 feet.
Drainage Area, 69 square miles.
Character of Drainage Basin: Mountains and rolling benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April, 14–30	24	22	23.1	779
May	114	15	54.1	3,330
June	1,070	119	405	24,100
July	188	32	120	7,380
August	77	16	31.5	1,940
September	28	11	19.3	1,150
October	30	27	27.7	1,700
November	33	28	29.1	1,730
Total Recorded	.....	.....	.....	42,100
Monthly Flow for the Year of 1909:				
April	122	14	45.6	2,710
May	270	50	140	8,610
June	535	142	280	16,700
July, 1–27	444	70	114	6,110
September, 20–30	34	25	29.1	635
October	34	21	28.2	1,730
Total Recorded	.....	.....	.....	36,500
Monthly Flow for the Year of 1910:				
January	.....	.....	a 18	1,110
February	.....	.....	a 20	1,110
March	.....	.....	a 25	1,540
April	.....	.....	a 28.4	1,690
May	38	24	29.7	1,830
June	33	9.8	18.4	1,100
July	9.8	1.8	2.57	158
August	1.8	1.8	1.8	111
September	50	1.8	21.7	1,290
October	33	33	33.0	2,030
November	33	23	a31.5	1,870
December	.....	.....	a20	1,230
Total Recorded	.....	.....	20.8	15,100

DUPUYER CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
January	.....	.....	b10	615
February	.....	.....	b 5	278
March	.....	.....	b20	1,230
April	43	24	35.4	2,110
May	136	33	77.5	4,760
June	186	72	115	6,840
July	97	42	60.6	3,730
August	108	42	58.9	3,620
September	234	42	141	8,390
October	86	42	70	4,300
November	.....	.....	b40	2,380
December	.....	.....	b20	1,230
Total Recorded	.....	.....	54.4	39,500
Mean Monthly Flow for the Period of Record:				
January	.....	.....	14.0	861
February	.....	.....	12.5	694
March	.....	.....	22.5	1,380
April	122	14	34.6	2,060
May	270	15	75.3	4,630
June	1,070	9.8	205	12,200
July	444	1.8	74.3	4,570
August	108	1.8	30.7	1,890
September	234	1.8	57.5	3,420
October	86	21	39.7	2,440
November	.....	.....	33.5	1,990
December	.....	.....	20.0	1,230
Mean Yearly	.....	.....	51.6	37,400

a—Estimated Jan. 1 to April 24, and Nov. 20 to Dec. 31, 1910.
b—Estimated Jan., Feb., Mar., Nov., and Dec., 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286, and 306.

DRY FORK OF MARIAS RIVER.

Observation Station Located in S. W. ¼ Sec. 36, T. 29 N., R. 5 W., near Valier, Mont.

Established in 1911.
Drainage Area, about 120 square miles.
Character of Drainage Basin: Is entirely of rolling bench lands with no mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
March, 16-31	153	15	55.9	1,770
April	24	1.3	10.0	595
May	366	0.9	44.5	2,740
June	35	0	5.91	352
July	24	0	1.95	120
August	153	0	13.6	836
September	429	0	70.1	4,170
October	139	6.5	28.4	1,750
November	28	10	18.6	1,110
December—a	.....	.....	10.0	615
Total Recorded	.....	.....	.....	14,100

a—Estimated.
Reference: U. S. G. S. Water Supply paper No. 306.

TETON RIVER AT STRABANE, MONTANA.

The earlier reports call this station Teton River near Belleview. It was established in 1904, and gage heights are published for 1905 and 1906, but sufficient measurements were not made to obtain a rating until 1908. It is located at Peebles' ranch, about sixteen miles West of Chouteau, in the N. E. ¼ Sec. 35, T. 25 N., R. 7 W.

Elevation of Head Waters, 8,000 feet.

Drainage Area, about 170 square miles.

Character of Drainage Basin: Rugged mountains, rolling benches, and a wide valley.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1908:						
June	1,680	345	909	5.34	54,100	5.96
July	345	167	253	1.49	15,600	1.72
August	141	95	118	.694	7,260	.80
September	95	76	79.8	.469	4,750	.52
October	95	76	86.4	.508	5,310	.59
November	95	60	78.5	.462	4,670	.52
December	76	33	55.4	.326	3,410	.38
Total Recorded	.....	.....	.....	.....	95,100	.....
Monthly Flow for the Year of 1909:						
January	65	38	56.5	.332	3,470	.38
February	80	38	52.1	.306	2,890	.32
March	45	22	32.4	.191	1,990	.22
April	60	32	43.7	.257	2,600	.29
May	720	60	232	1.36	14,300	1.57
June	1,040	695	852	5.01	50,700	5.59
July	965	175	440	2.59	27,100	2.99
August	580	140	280	1.65	17,200	1.90
September	140	110	124	.729	7,380	.81
October	105	70	93.1	.548	5,720	.63
November	120	70	100	.588	5,950	.66
December	160	85	128	.753	7,870	.87
Total Recorded	1,040	22	203	1.19	147,000	16.23
Monthly Flow for the Year of 1910:						
January	150	60	105	.618	6,460	.71
February	100	42	63	.371	3,500	.39
March	105	52	71	.418	4,400	.48
April	450	63	176	1.04	10,500	1.16
May	508	317	382	2.25	23,500	2.59
June	374	108	249	1.46	14,800	1.63
July	137	55	87.5	.514	5,380	.59
August	82	33	54.8	.322	3,370	.37
September	127	36	69.6	.409	4,140	.46
October	117	50	79.6	.468	4,890	.54
November	117	50	79.7	.469	4,740	.52
December	67	42	55.6	.327	3,420	.38
Total Recorded	508	33	123	.724	89,100	9.82
Monthly Flow for the Year of 1911:						
January	...	...	a35	.206	2,150	.24
February	...	...	a30	.176	1,670	.18
March	...	...	a38.4	.226	2,360	.26
April	121	30	53.6	.316	3,190	.35
May	750	96	280	1.65	17,200	1.90
June	620	168	301	1.77	17,900	1.98
July	190	130	154	.906	9,470	1.04
August	168	73	108	.635	6,640	.73
September	130	80	109	.641	6,490	.72
October	130	104	114	.671	7,010	.77
November	112	47	84.0	.494	5,000	.55
December	66	30	50.5	.297	3,110	.34
Total Recorded	750	30	113	.666	76,800	9.06
Mean Monthly Flow for the Period of Record:						
January	150	..	65.5	.385	4,030	.44
February	100	..	48.4	.285	2,690	.30
March	105	..	47.3	.278	2,910	.32
April	450	30	91.1	.536	5,420	.60
May	750	60	298	1.75	18,300	2.02
June	1,680	108	578	3.40	34,400	3.79
July	965	55	234	1.38	14,400	1.59

TETON RIVER AT STRABANE, MONTANA—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
August	580	33	140	.824	8,610	.95
September	140	36	95.6	.562	5,690	.63
October	130	50	93.3	.548	5,740	.63
November	120	47	85.6	.504	5,090	.56
December	160	30	72.4	.426	4,450	.49
Mean Yearly	1,680	...	154	.906	112,000	12.32

a—Estimated January 1 to March 22, 1911.

Note.—Discharge measurements prior to 1908 were made as follows: Nov. 27, 1904, 58 sec.-ft.; May 8, 1905, 48 sec.-ft.; Oct. 12, 1905, 56 sec.-ft.; Nov. 4, 1905. 51 sec.-ft.; April 12, 1906, 25.2 sec.-ft.; May 9, 1906, 43.1 sec.-ft.; June 22, 1906, 17.0 sec.-ft. No record was obtained during 1907.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 130, 172, 208, 246, 266 286 and 306.

Water Rights Decreed on Stream in 1905, 17,760 inches, or 444 Sec. Ft.

TETON RIVER NEAR CHOUTEAU, MONTANA.

This station was established November 30, 1904. on the road to Augusta one and one-half miles from Chouteau, and discontinued July 31, 1906.

The following discharge measuremments were made in 1904-5:

November 29, 1904 ..... 7.3 second-feet.
May 9, 1905 ..... 8 second-feet.
October 13, 1905 ..... 3 second-feet.

Gage heights are published for December, 1904, and for a number of davs in 1905, but a rating was not obtained.

Monthly Discharge of Teton River Near Chouteau, Mont., for 1906.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Feet Total Acre
April	7	1	3.9	232
May	6	1	4.1	252
June, 9-30	30	7	15.7	684
July, 1-20	6	1	2.8	111
Total Recorded	.....	.....	.....	1,280

A measurement near Chouteau, August 7, 1889, gave 26 sec.-ft.

References: U. S. G. S. Annual Report No. 11, Part 2; U. S. G. S. Water Supply papers 130, 172, 208.

DEEP CREEK.

Observation Station Located in N. W. ¼ Sec. 15, T. 23 N., R. 5 W., Near Choteau, Mont.

Established in 1911.
Elevation of Head Waters, 8,000 feet.
Character of Drainage Basin: Mountains and benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
March. 24-31	76	43	51	810
April	76	30	43.1	2,560
May	582	43	147	9,040
June	425	107	170	10,100
July	196	43	84.0	5,160
August	162	30	62.0	3,810
September	162	18	63.3	3,770
October	67	30	42.5	2,610
November	..	..	a27.7	1,650
December	..	..	a15	922
Total Recorded	..	..	.....	40,400

a—Estimated November 9 to December 31.
Reference for daily flow in U. S. G. S. Water Supply Paper 306.

JUDITH RIVER.

Observation Station Located Thirty Miles Northwest of Lewistown, Mont.

Established in 1910:
Elevation of Head Waters, 8,000 feet.
Drainage Area, 2,050 square miles.
Character of Drainage Basin: Chiefly Agricultural.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1910:				
September	400	350	353	21,000
October	350	325	337	20,700
November	350	350	350	20,800
December	350	350	350	21,500

Reference: U. S. G. S. Water Supply Paper No. 286.
Note—The station was discontinued December 31, 1910.

NORTH FORK OF MUSSELSHELL RIVER.

Observation Station Located in S. W. ¼ Sec. 35, T. 10 N., R. 9 E., Near Delpine, Mont.

Established in 1909.

Elevation of Station, 5,400 feet.

Elevation of Head Waters, 8,000 feet.

Rainfall observed at Copper, Mont.

Drainage Area, 50 square miles.

Character of Drainage Basin: The stream rises in the mountains and flows through small irrigated meadows.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly flow for the Year of 1909:						
May	47	12.0	19.5	.390	1,200	.45
June	80	16.5	49.8	.996	2,960	1.11
July	43	12.0	23.5	.470	1,440	.54
August	22	8.2	15.7	.314	965	.36
September	28	8.2	10.8	.216	643	.24
October	12.0	8.2	10.5	.210	646	.24
November	12.0	10.1	10.2	.204	384	.23
Total Recorded	....	....	....	....	8,240	3.17
Monthly Flow for the Year of 1910:						
January—a	..	..	10	.200	615	.23
February—a	..	..	10	.200	555	.21
March—a	178	..	49	.980	3,010	1.13
April	23	14	19.5	.390	1,160	.44
May	31	14	18.7	.374	1,150	.43
June	28	5.7	9.79	.196	583	.22
July	6.6	4.8	5.56	.111	342	.13
August	6.6	5.2	5.79	.116	356	.13
September	6.6	5.2	6.01	.120	358	.13
October—b	...	...	6.05	.121	372	.14
November—b	...	...	7.5	.150	446	.17
December—a	...	...	7.5	.150	461	.17
Total Recorded	...	...	13.0	.260	9,410	3.53
Monthly Flow for the Year of 1911:						
January—c	..	..	7.0	.140	430	.16
February—c	..	..	6.0	.120	333	.12
March—c	71	..	17.5	.350	1,080	.40
April	36	10	17.0	.340	1,010	.38
May	39	13	19.8	.396	1,220	.46
June	31	10	19.8	.396	1,180	.44
July	12	6.4	8.71	.174	536	.20
August	13	5.6	7.11	.142	437	.16
September	5.6	4.0	4.37	.087	260	.10
October	5.2	4.1	4.67	.093	287	.11
November—c	...	...	4.5	.090	268	.10
December—c	...	...	4.5	.090	277	.10
Total Recorded	...	...	10.1	.202	7,320	2.73
Mean Monthly Flow for the Period of Record:						
January	...	..	8.50	.170	523	.20
February	...	..	8.00	.160	444	.17
March	178	..	33.2	.664	2,040	.77
April	71	10	18.2	.364	1,080	.41
May	47	12	19.3	.386	1,190	.44
June	80	5.7	26.5	.530	1,580	.59
July	43	4.8	12.6	.252	775	.29
August	22	5.2	9.53	.191	586	.22
September	28	4.0	7.06	.141	420	.16
October	12	4.1	7.07	.141	435	.16
November	12	...	7.40	.148	440	.17
December	..	...	6.00	.120	369	.14
Mean Yearly	..	...	13.6	.272	9,880	3.72

a—Discharge estimated January 1 to March 9, and November 22 to December 31, 1910.
b—Discharge interpolated October 1 to 13, 15 to 31, and November 1 to 9, 1910.
c—Estimated January 1 to March 15, and October 21 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266, 286 and 306.

NORTH FORK OF MUSSELSHELL RIVER—(Continued).

Note on Relation of Run-off to Rainfall:—From May to November, 1909, the rainfall at Copper was 15.33 inches, and the run-off (3.17 inches) was 20.6 per cent of the rainfall. In 1910 the rainfall was 16.31 inches, and the run-off 21.6 per cent of the rainfall. In 1911 the rainfall was 15.33 inches, and the run-off 17.8 per cent of the rainfall. The mean annual rainfall for the above period of record was 17.04 inches, and the mean run-off 21.8 per cent of the mean precipitation at Copper.

Rainfall at Copper: Maximum, 19.77 inches in 1909. Minimum, 15.33 inches in 1911. Mean, 18.1 inches for seven years, 1905 to 1911 inclusive.

NORTH FORK OF MUSSELSHELL RIVER.

Observation Station Located in Sec. 6, T. 8 N., R. 12 E., 4 Miles N. of Martinsdale, Mont.

Established in 1907.

Elevation of Station, 4,600 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 244 square miles.

Character of Drainage Basin: Mostly mountainous, with a narrow irrigated valley and some benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
July, 10–31	289	83	132	5,760
August	83	34	52.6	3,230
September	44	28	36.4	2,170
October	44	24	34.2	2,100
November	51	28	39.1	2,330
Monthly Flow for the Year of 1908:				
April, 5–30	63	19	320	1,650
May	412	5.5	32.4	1,990
June	529	44	239	14,200
July	44	7	15.7	965
August	39	3	16.2	996
September	39	10	18.5	1,100
October	44	24	40.1	2,470
November, 1–9	44	44	44.0	785
Total Recorded	..	..	....	24,200
Monthly Flow for the Year of 1909:				
April	151	34	63.6	3,780
May	415	63	163	10,000
June	231	73	148	8,810
July	520	16	74.5	4,580
August	66	28	36.7	2,260
September	79	38	57.4	3,420
October	43	33	40.6	2,500
November	79	38	43.4	2,580
December, 1–6	66	24	49.3	586
Total Recorded	..	..	....	38,500
Monthly Flow for the Year of 1910:				
January	...	..	a25	1,540
February	...	..	a20	1,110
March	410	20	a174	10,700
April	119	58	91	5,420
May	90	20	61.8	3,800
June	40	1.8	10.5	625
July	20	1.0	3.51	216
August	5	0.5	1.83	113
September	30	1.0	13.0	774
October	52	13	18.4	1,130
November	58	30	a33.9	2,020
December	25	20	a22.3	1,370
Total Recorded	..	..	39.6	28,800
Monthly Flow for the Year of 1911:				
January	...	..	b20	1,230
February	...	..	b18	1,000
March	105	..	b41.0	2,520
April	89	37	52.2	3,110
May	218	48	89.3	5,490
June	248	27	83.4	4,960
July	37	7	19.6	1,210

NORTH FORK OF MUSSELSHELL RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
August	89	16	30.6	1,880
September	23	16	19.1	1,140
October	60	23	27.9	1,720
November	..	..	b28.1	1,670
December	..	..	b20	1,230
Total Recorded	248	..	37.5	27,200
Mean Monthly Flow for the Period of Record:				
January	...	..	22.5	1,380
February	...	..	19.0	1,060
March	410	..	108	6,640
April	151	19	59.7	3,550
May	415	5.5	86.6	5,320
June	529	1.8	120	7,140
July	520	1.0	43.1	2,650
August	89	0.5	27.6	1,700
September	79	1.0	28.9	1,720
October	60	13	32.2	1,980
November	79	..	36.7	2,180
December	66	..	23.7	1,460
Mean Yearly	..	..	50.6	36,800

a—Estimated January 1 to March 6, and November 16 to December 31, 1910.
b—Estimated January 1 to March 19, and November 9 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Suply Papers Nos. 246, 286, 266 and 306.

MUSSELSHELL RIVER.

Observation Station Located in Sec. 26, T. 8 N., R. 15 E., at Harlowton, Mont.
Established in 1907.
Elevation of Station, 4,160 feet.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 1,150 square miles.
Character of Drainage Basin: Mountainous, bench lands, and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
July, 11–31	865	272	471	19,600
August	760	170	250	15,400
September	190	108	125	7,440
October	125	105	119	7,320
November	118	95	107	6,370
Monthly Flow for the Year of 1908:				
May	2,940	91	643	39,500
June, 5–23	1,820	560	1,210	45,600
August	24	.4	5.56	342
September	50	4.1	21.6	1,290
Monthly Flow for the Year of 1909:				
April, 10–30	302	83	144	5,990
May	1,360	118	426	26,200
June	1,310	440	888	52,800
July	1,320	90	268	16,500
August	166	80	111	6,820
September	250	112	156	9,280
October	150	100	123	7,560
November	136	100	119	7,080
Total Recorded	.....	.....	.....	132,000
Monthly Flow for the Year of 1910:				
January	.....	.....	a45	2,770
February	.....	.....	a45	2,500
March	550	.....	325	20,000

MUSSELSHELL RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
April	615	151	322	19,200
May	615	187	375	23,100
June	460	16	103	6,130
July	119	2	15.7	965
August	2	0	.37	23
September	66	.4	35.9	2,140
October	66	44	57.8	3,550
November	156	66	85.8	5,110
December	92	.....	49.6	3,050
Total Recorded	615	0	122	88,500
Monthly Flow for the Year of 1911:				
January—b	.....	.....	45	2,770
February—b	.....	.....	50	2,780
March—b	320	.....	131	8,060
April	280	105	154	9,160
May	1,160	200	534	32,800
June	2,540	180	878	52,200
July	168	8	57.1	3,510
August	180	30	78.1	4,800
September	68	28	58.0	3,450
October	89	51	73.1	,4,490
November—b	76	.....	46	2,740
December—b	.....	.....	40	2,460
Total Recorded	2,540	.....	179	129,000
Mean Monthly Flow for the Period of Record:				
January	.....	.....	45.0	2,770
February	.....	.....	47.5	2,640
March	550	.....	228	14,000
April	615	83	214	12,700
May	2,940	91	494	30,400
June	2,540	16	730	43,400
July	1,320	2	179	11,000
August	760	0	89.0	5,470
September	250	0.4	79.3	4,720
October	150	44	93.2	5,730
November	156	.....	94.4	5,620
December	.....	.....	44.8	2,750
Mean Yearly	2,940	0	195	141,000

a—Estimated.

b—Estimated Jan. 1 to Mar 11, and Nov. 13 to Dec. 31, 1911.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286, and 306.

MUSSELSHELL RIVER.

Observation Station Located in T. 7. N., R. 18 E., at Shawmut, Mont.

Established in 1902.
Elevation of Station, 3,850 feet.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 1,520 square miles.
Character of Drainage Basin: Mountains, benchlands, and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
March	245	71	113	6,950
April	103	52	81.4	4,840
May	154	46	91.5	5,630
June	1,580	166	603	35,900
July	1,330	11	139	8,550
August	410	11	52.1	3,200
September	11	2	5.7	340
October	71	4	26.7	1,640
November, 1–26	71	46	59.8	3,080
Total Recorded	.....	.....	.....	70,100
Monthly Flow for the Year of 1906:				
February, 13–24	122	58	97.6	3,100
March, 1–10, 21–27, 31	305	86	129	4,610
April	340	178	242	14,400
May, 14–31	450	166	281	10,000
June	375	103	254	15,100
July	122	7	38.8	2,390
August	24	2	6.7	418
September	40	15	25.5	1,520
Total Recorded	.....	.....	.....	51,500
Monthly Flow for the Year of 1907:				
February, 5–11	1,290	880	112	1,550
March, 3–16	725	490	586	16,300
April, 25–30	825	725	800	9,500
May	2,400	725	1,192	73,200
June	a2,600	825	a1,680	100,000
Total Recorded	.....	.....	.....	201,000

a—Estimated June 23–27, water over gage. Discontinued June 30. All discharges for 1907 are approximate and liable to be considerably in error.

Note—Gage heights are published for 1902–04, but no rating was obtained for those years, and the only discharge measurement was 74 sec.-ft., on Nov. 8, 1904.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 84, 99, 130, 172, 208 and 246.

MUSSELSHELL RIVER.

Observation Station Located in T. 6 N., R. 22 E., at Lavina, Mont.

Established in 1906.
Elevation of Station, about 3,400 feet.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 2,750 square miles.
Character of Drainage Basin: Mountains, benchlands and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1906:				
June	725	205	385	23,000
July	200	40	121	4,440

Discharge, March 29, 1906, 888 second-feet.
Reference for daily flow in U. S. G. S. Water Supply Paper No. 208.

CHECKERBOARD CREEK.

Observation Station Located in S. W. ¼ Sec. 4, T. 9 N., R. 9 E., near Delpine, Mont.

Established in 1909.
Elevation of Station, 5,500 feet.
Elevation of Head Waters, 7,000 feet.
Rainfall observed at Copper, Mont.
Drainage Area, 23 square miles.
Character of Drainage Basin: Steep, rocky, partially forested mountains.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1909:						
May	146	16	43.0	1.87	2,640	2.16
June	40	16	24.7	1.08	1,470	1.20
July	16	7.2	10.1	.439	621	.51
August	9.2	7.2	7.85	.341	483	.39
September	13.6	7.2	8.21	.357	489	.40
October	7.2	5.6	6.97	.303	429	.35
November	7.2	7.2	7.20	.313	428	.35
Total Recorded	.....	.....	.....	.672	6,560	5.36
Monthly Flow for the Year of 1910:						
January	.....	.....	a4.5	.196	277	.23
February	.....	.....	a5.0	.217	278	.23
March	.....	.....	a9.90	.430	609	.50
April	17	8.2	13.8	.600	821	.67
May	17	8.2	12.0	.522	738	.60
June	9.6	5.3	7.22	.314	430	.35
July	5.6	5.2	5.37	.234	330	.27
August	5.2	4.0	4.45	.194	274	.22
September	4.1	2.7	3.93	.171	234	.19
October	.....	.....	a3.3	.144	203	.17
November	.....	.....	a3.65	.159	217	.18
December	.....	.....	a4.06	.176	250	.20
Total Recorded	.....	.....	6.43	.280	4,660	3.81
Monthly Flow for the Year of 1911:						
January	.....	.....	b3.0	.130	184	.15
February	.....	.....	b3.0	.130	167	.14
March	7.0	.....	b4.5	.196	277	.23
April	9.0	5.4	6.71	.292	399	.33
May	31	7.4	20.5	.892	1,260	1.03
June	64	9.8	25.8	1.12	1,540	1.25
July	6.9	5.4	6.09	.265	374	.31
August	8.0	4.9	5.24	.228	322	.26
September	4.9	4.9	4.90	.213	292	.24
October	4.9	3.7	4.18	.182	257	.21
November	.....	.....	b3.5	.152	208	.17
December	.....	.....	b3.5	.152	215	.18
Total Recorded	64	.....	7.58	.329	5,500	4.50
Mean Monthly Flow for the Period of Record:						
January	.....	.....	3.75	.163	231	.19
February	.....	.....	4.00	.174	222	.18
March	.....	.....	7.20	.313	443	.36
April	17	5.4	10.3	.448	613	.50
May	146	7.4	25.2	1.10	1,550	1.27
June	64	5.3	19.2	.836	1,140	.93
July	16	5.2	7.19	.313	442	.36
August	9.2	4.0	5.85	.254	360	.29
September	13.6	2.7	5.68	.247	338	.28
October	7.2	.....	4.82	.210	296	.24
November	.....	.....	4.78	.208	284	.23
December	.....	.....	3.78	.164	232	.19
Mean Yearly	146	.....	8.49	.370	6,150	5.02

a—Discharge estimated Jan. 1 to Mar. 9, Oct. 1 to Nov. 9, and Dec. 19–31, 1910.
b—Discharge estimated Jan. 1 to Mar. 15, and Nov. 1 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 266, 286 and 306.

Note on Relation of Run-off to Rainfall—The rainfall at Copper for May to Nov. 1909, was 15.33 inches. The run-off for that period (5.36 inches) was 35.0 per cent of the rainfall. In 1910 the rainfall was 16.31 inches and the run-off was 23.4 per cent of the rain-

CHECKERBOARD—(Continued).

fall. In 1911 the rainfall was 15.33 inches an the run-off was 29.3 per cent of the rainfall. The mean annual rainfall for the above period of record was 17.04 inches, and the mean annual run-off was 29.5 per cent of the rainfall at Copper.

Rainfall at Copper, Maximum 19.7 inches in 1909; Minimum 15.3 inches in 1911; Mean 18.1 inches for seven years, 1905 to 1911 inclusive.

SOUTH FORK OF MUSSELSHELL RIVER.

Observation Station Located in Sec. 12, T. 8 N., R. 11 E., 1½ Miles East of Martinsdale, Mont.

Established in 1907.
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 288 square miles.
Character of Drainage Basin: Mountains and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
June, 9 days	527	150	318	5,680
July	314	88	168	10,000
August	150	15	58.5	3,600
September	44	7	34.3	2,040
October	51	26	34.2	2,100
November	32	20	25.6	1,520
Monthly Flow for the Year of 1908:				
April, 5–30	150	20	67.0	3,460
May	651	54	168	10,300
June	768	150	483	28,700
July	143	1	34.9	2,150
August	15	0	4.11	253
September	66	0	4.78	284
October	58	27	43.1	2,650
November, 1–9	58	54	55.8	996
Total Recorded	.....	.....	.....	48,800
Monthly Flow for the Year of 1909:				
April	143	28	51.8	3,080
May	1,140	46	304	18,700
June	902	185	497	29,600
July	178	40	78.0	4,800
August	40	14	24.5	1,510
September	163	22	57.9	3,450
October	54	30	44.8	2,750
November, 1–13	40	36	36.6	944
Total Recorded	.....	.....	.....	65,800
Monthly Flow for the Year of 1910:				
January	.....	.....	a20	1,230
February	.....	.....	a25	1,390
March	.....	.....	a251	15,400
April	545	81	201	12,000
May	447	116	228	14,000
June	116	3	67.1	3,990
July	24	.5	3.13	192
August	.5	.2	.47	29
September	30	.5	16.8	1,000
October	27	24	24.8	1,530
November	37	24	27.3	1,620
December	.....	.....	a20	1,230
Total Recorded	.....	.....	73.7	53,600
Monthly Flow for the Year of 1911:				
January	.....	.....	b10.0	615
February	.....	.....	b 7.0	389
March	148	.....	b35.8	2,200
April	116	24	69.0	4,110
May	1,080	92	339	20,800
June	1,260	62	448	26,700
July	71	2.0	13.7	842
August	34	2.0	18.5	1,140
September	24	9.5	13.8	821
October	41	15	24.0	1,480

SOUTH FORK OF MUSSELSHELL RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
November	..	..	b18.0	1,070
December	..	..	b12.0	738
Total Recorded	1,260	2.0	84.1	60,900
Mean Monthly Flow for the Period of Record:				
January	...	..	15.0	922
February	...	..	16.0	889
March	...	..	143	8,790
April	545	20	97.2	5,780
May	1,140	46	260	16,000
June	1,260	3	369	22,000
July	314	0.5	59.5	3,660
August	150	0	21.2	1,300
September	66	0	25.5	1,520
October	58	15	34.2	2,100
November	58	..	27.7	1,650
December	..	..	16.0	984
Mean Yearly	1,260	0	90.4	65,600

a—Estimated January 1 to March 12, and December, 1910.
b—Estimated January 1 to March 18, and November 1 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Papers Nos. 246, 266, 286 and 306.

AMERICAN FORK

Observation Station Located in T. 7 N., R. 15 E., 5 Miles Southeast of Harlowton, Mont.

Established in 1907.

Elevation of Station, 4,300 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 110 square miles.

Character of Drainage Basin: Source in Crazy Mountains. Most of basin is sloping gradually to the northeast.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
August	42.0	1.5	9.50	584
September	10.3	1.5	2.76	164
October	6.6	1.5	3.30	203
November	4.0	4.0	4.00	238
December, 1–8	4.0	4.0	4.00	63
Total Recorded	...	...	....	1,250
Monthly Flow for the Year of 1908:				
April	4.3	2.6	3.85	229
May	541	1.0	34.4	2,120
June	870	45	284	16,900
July	45	.2	12.5	769
August	0	0	0	0
September	0	0	0	0
October	19	.2	13.2	812
November, 1–12	15	11	11.3	269
Total Recorded	..	..	....	21,100
Monthly Flow for the Year of 1909:				
March, 17–31	6.8	4.1	6.08	181
April	6.8	2.6	3.68	219
May	175	2.6	36.1	2,220
June	484	43	174	10,400
July	44	.1	17.7	1,090
August	8.0	0	2.38	146
September	26	0	3.87	230
October	3.2	2.0	2.58	159
November	2.0	1.2	1.84	109
Total Recorded	...	...	....	14,800

AMERICAN FORK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
January	...	.	a1.5	92
February	...	.	a2.0	111
March	...	.	a6.0	369
April	...	.	5.13	305
May	109	2	35.1	2,160
June	10	0	1.39	83
July	..	.	0	0
August	..	.	0	0
September	5.8	0	.56	33
October	3	2	2.07	127
November	3	2	2.47	147
December	..	..	a1.5	92
Total Recorded	.	.	4.81	3,520
Monthly Flow for the Year of 1911:				
January	...	...	b1.00	61
February	...	...	b.90	50
March	4.8	1.0	b1.57	97
April	6.0	2.0	3.45	205
May	208	2.0	55.9	3,440
June	535	1.5	155	9,220
July	8.0	0	1.20	74
August	2.0	.6	1.13	69
September	8.0	.8	2.58	154
October	2.8	1.5	1.95	120
November	...	...	b1.00	60
December	...	...	b1.00	61
Total Recorded	535	0	18.8	13.600
Mean Monthly Flow for the Period of Record:				
January	...	...	1.25	77
February	...	...	1.45	81
March	...	...	4.24	261
April	6.8	2.0	4.03	240
May	541	1.0	40.4	2,480
June	870	0	154	9,160
July	45	0	7.85	483
August	42	0	2.60	160
September	26	0	2.26	134
October	19	.2	4.70	289
November	15	1.2	3.93	234
December	..	...	1.60	98
Mean Yearly	870	0	19.0	13,700

a—Estimated January 1 to April 9 and November 28 to December 31, 1910.
b—Estimated January 1 to March 25 and November 6 to December 31. 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

LEBO CREEK.

Observation Station Located in T. 7 N., R. 15 E., 5 Miles Southeast of Harlowton, Mont.

Established in 1907.
Elevation of Station, 4,300 feet.
Elevation of Head Waters, 5,600 feet.
Drainage Area, 48 square miles.
Character of Drainage Basin: Almost flat. Stream fed by springs.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April	24	18	20.8	1,240
May	154	21	47.4	2,910
June	70	17	30.9	1,840
July	40	10	18.5	1,140
August	17	9	14.5	892
September	25	16	18.5	1,100
October	22	18	19.2	1,180
November	22	22	22.0	1,310
Total Recorded	..	..	....	11,600
Monthly Flow for the Year of 1910:				
January	..	..	a12	738
February	..	..	a12	666
March	..	..	a13	799
April	..	..	a11	655
May	29	12	18.8	1,160
June	27	1.9	9.26	551
July	5.9	.4	2.78	171
August	9.6	2.8	5.34	328
September	26	9.6	17.8	1,060
October	12	9.6	11	676
November	..	...	a12.2	726
December	..	...	a10	615
Total Recorded	..	...	11.3	8,140
Monthly Flow for the Year of 1911:				
January	..	..	b10	615
February	..	..	b15	833
March	..	..	b20	1,230
April	25	17	18.6	1,110
May	88	14	31.3	1,920
June	64	8	24.6	1,460
July	26	1.5	7.82	481
August	24	12	18.9	1,160
September	22	14	16.9	1,010
October	24	12	16.3	1,000
November	..	..	b12	714
December	..	..	b10	615
Total Recorded	88	..	16.8	12,100
Mean Monthly Flow for the Period of Record:				
January	..	..	11.0	676
February	..	..	13.5	750
March	..	..	16.5	1,014
April	25	..	16.8	1,000
May	154	12	32.5	2,000
June	70	1.9	21.6	1,290
July	40	.4	9.70	596
August	24	2.8	12.9	793
September	26	9.6	17.7	1,050
October	24	9.6	15.5	953
November	..	...	15.4	916
December	..	...	10.0	615
Mean Yearly	154	.4	16.1	11,700

a—Estimated January 1 to April 9, and November 21 to December 31, 1910.
b—Estimated January 1 to March 25, and November 6 to December 31, 1911.
Note:—Although the station was established in 1907, a satisfactory rating was not obtained until 1909. Discharge measurements prior to 1909 were made as follows:
1906—November 11, 11.6 sec.-ft. (weir measurement).
1907—July 28, 16.5 sec.-ft.; September 6, 18.8 sec.-ft.; October 31, 20.3 sec.-ft.
1908—April 28, 14.1 sec.-ft.; June 5, 33.5 sec.-ft.; June 23, 27.7 sec.-ft.; July 27, 8.8 sec.-ft.; and September 24, 10.2 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

FLATWILLOW CREEK.

Observation Station Located 8 Miles Above Flatwillow, Mont.

Established in 1911.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 175 square miles.

Character of Drainage Basin: Source in Big Snowy Mountains; flows through an irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
May	244	14	82.4	5,070
June	292	52	145	8,630
July	47	5	19.0	1,170
August	52	12	33.3	2,050
September	16	5	10.4	619
October	37	8	19.8	1,220
November	24	16	19.9	1,180
December	..	..	a20.0	1,230
Total Recorded	..	..	.....	21,200

a—Estimated.

Reference: U. S. G. S. Water Supply Paper 306.

SOUTH FORK OF MILK RIVER.

Observation Station Located in T. 37 N., R. 9 W., 40 Miles Northeast of Browning, Mont.

Established in 1905.

Elevation of Head Waters, 7,000 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
May	78	30	51	3,120
June	144	30	49	2,920
July	51	9	24	1,440
August	30	2	8.5	523
September	9	2	4.4	262
October, 1–17	23	12	17	587
Total Recorded	..	..	..	8,850
Monthly Flow for the Year of 1906:				
March, 16–31	76	10	25.7	816
April	118	10	40.2	2,390
May	427	13	76.1	4,680
June	406	32	90.7	5,400
July	32	3	12.6	775
August	46	1	10.7	658
September	10	5	7.3	434
October	29	6	14.3	879
November	42	7	23.6	1,400
Total Recorded	..	.	....	17,400
Monthly Flow for the Year of 1907:				
April, 9–30	370	60	67.0	2,920
May	623	165	301	18,500
June	1,690	170	378	22,500
July	250	56	148	9,100
August	89	30	54.6	3,360
September	286	43	93.9	5,590
October	68	46	51.8	3,190
November, 1–23	46	22	40.8	1,860
Total Recorded	..	..	....	67,000
Monthly Flow for the Year of 1908:				
April	695	104	402	23,900
May	565	125	267	16,400
August	80	41	71.0	4,370
September	176	25	47.1	2,800

SOUTH FORK OF MILK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
October	176	41	84.5	5,200
November	132	65	103	6,130
Total Recorded	...	..	...	58,800
Monthly Flow for the Year of 1909:				
June	815	147	334	19,900
July	900	52	185	11,400
August	147	32	60.2	3,700
September	52	32	38.0	2,260
October	41	32	34.5	2,120
November	109	27	48.7	2,900
Total Recorded	...	..	....	42,300
Monthly Flow for the Year of 1910:				
January—a	...	..	25	1,540
February—a	...	..	25	1,390
March—a	...	..	65	4,000
April	195	65	129	7,680
May	208	72	114	7,010
June	246	29	67.8	4,030
July	28	8.4	17.7	1,090
August	16	8	10.9	670
September	47	17	33.3	1,980
October	42	28	31.5	1,940
November	52	16	28.4	1,690
December—a	..	..	25	1,540
Total Recorded	..	..	47.7	34,600
Monthly Flow for the Year of 1911:				
January—b	.....	...	15	922
February—b	.....	...	15	833
March—b	.....	...	150	9,220
April—b	.....	...	159	9,460
May	1,040	133	267	16,400
June	918	78	207	12,300
July	273	44	94.3	5,800
August	122	28	60.6	3,730
September	400	20	128	7,620
October	94	20	62.5	3,840
November—b	..	..	30	1,790
December—b	..	..	25	1,540
Total Recorded	1,040	..	102	73,500
Mean Monthly Flow for the Period of Record:				
January	...	..	20.0	1,230
February	...	..	20.0	1,110
March	...	..	91.1	5,600
April	695	10	166	9,880
May	1,040	13	179	11,000
June	1,690	29	188	11,200
July	900	3	80.3	4,940
August	147	1	39.5	2,430
September	400	2	50.3	2,990
October	176	6	44.2	2,720
November	132	7	46.0	2,740
December	...	.	25.0	1,540
Mean Yearly	1,690	1	79.1	57,400

a—Estimated January, February, March and December, 1910.
b—Estimated January 1 to April 22, November and December, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246, 266 and 306.

MILK RIVER.

Observation Station Located in S. E. ¼ Sec. 5, T. 32 N., R. 16 E., at Havre, Mont.

Established in 1898.
Elevation of Station, 2,470 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 7,300 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1898:				
May, 15 to 31—b	2,432	836	1,396	85,800
June	2,546	200	1,354	80,600
July	950	0	168	10,300
August	893	33	113	6,950
September	104	11	53	3,150
October	125	11	88	5,410
November, 1 to 19—b	110	93	100	5,950
December	125	110	113	6,950
Total Recorded	.....	.....	.....	205,000
Monthly Flow for the Year of 1899:				
January—a	.....	.....	430	26,400
April	2,880	620	1,365	81,200
May	1,680	570	1,006	61,900
June—a	.....	.....	940	55,900
July—a	.....	.....	241	14,800
August—a	.....	.....	196	12,000
September	235	84	131	7,800
October	110	80	94	5,780
November—a	.....	.....	190	11,300
Total Recorded	.....	.....	.....	277,000
Monthly Flow for the Year of 1900:				
April, 10 to 30—b	640	280	394	23,400
May	1,575	129	435	26,800
June	355	76	154	9,160
July	91	21	43	2,640
August	232	8	40	2,460
September	169	21	76	4,520
October	355	76	186	11,400
November, 1 to 15—b	169	63	114	6,780
December, 17 to 22	.....	.....	15	.....
Total Recorded	.....	.....	.....	82,200
Monthly Flow for the Year of 1901:				
March, 10 to 30—b	.....	.....	600	36,900
April	330	115	205	12,200
May	2,540	230	648	39,800
June	1,340	330	553	32,900
July	460	65	184	11,300
August	65	12	28	1,720
September	95	11	56	3,330
October	95	65	82	5,040
November	95	65	80	4,760
Total Recorded	.....	.....	.....	148,000
Monthly Flow for the Year of 1902:				
January	180	180	180	11,100
February—b	.....	.....	208	11,600
March	465	170	249	15,300
April	268	161	196	11,700
May	7,668	180	1,085	66,700
June	4,616	465	1,479	88,000
July	8,960	630	2,045	126,000
August	710	310	377	23,200
September	335	250	297	17,700
October	335	288	309	19,000
November—a	.....	.....	300	17,800
December—a	.....	.....	300	18,500
Total Recorded	8,960	161	586	427,000
Monthly Flow for the Year of 1903:				
January—a	.....	.....	200	12,300
February—a	.....	.....	200	11,100
March—a	.....	.....	240	14,800
April	1,620	620	996	59,300
May	4,120	285	1,079	66,300
June	2,820	507	975	58,000

MILK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
July	795	168	445	27,400
August	795	145	378	23,200
September	339	118	164	9,760
October	195	110	138	8,480
November—b	.....	.....	115	6,840
December—a	.....	.....	147	9,040
Total Recorded	4,120	110	423	306,000
Monthly Flow for the Year of 1904:				
Januarv—a	.....	.....	90	5,530
February—a	.....	.....	75	4,310
March—a	.....	.....	75	4,610
April	4,900	340	1,736	103,000
May	580	230	373	22,900
June	490	105	274	16,500
July	90	10	44	2,700
August	22	0	5	307
September	10	1	3	178
October	41	3	19	1,170
November	51	22	35	2,080
December—a	.....	.....	25	1,540
Total Recorded	4,900	0	230	165,000
Monthly Flow for the Year of 1905:				
Januarv—a	.....	.....	5	307
February—a	.....	.....	5	278
March—b	.....	.....	40	2,460
April	102	46	59	3,510
May	102	36	62	3,810
June	94	10	35	2,080
July	366	0	54	3,320
August	102	0	25	1,290
Total Recorded	.....	.....	.....	17,100
Monthly Flow for the Year of 1906:				
March, 27–31	183	104	130	1,290
April	183	32	94.6	5,630
May	1,230	24	119	7,320
June	3,690	420	935	55,600
July	390	9	101	6,210
August	14	3	5.2	320
September	4	2	2.8	167
October	2	1	1.5	92
November, 1–15—c	1	1	1.0	30
December	0	0	0	0
Total Recorded	3,690	0	.....	76,700
Monthly Flow for the Year of 1907:				
February—a	.....	.....	800	44,400
March—b	3,750	.....	845	52,000
April	3,500	275	1,210	72,000
May	760	255	458	28,200
June	3,720	325	822	48,900
July	1,000	130	397	24,400
August	110	40	61.6	3,790
September	288	40	127	7,560
October	145	62	81.8	5,030
November	100	50	72.5	4,310
December—a	.....	.....	60	3,690
Total Recorded	3,750	.....	411	294,000
Monthly Flow for the Year of 1908:				
March	280	170	212	13,000
April	485	208	295	17,600
May	760	205	330	20,300
June	9,600	660	2,190	130,000
July	810	280	527	32,400
August	230	140	177	10,900
September	150	90	124	7,380
October	285	90	178	10,900
November	350	135	186	11,100
Total Recorded	9,600	.....	.....	254,000

MILK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
March	450	285	354	21,800
April	1,400	245	430	25,600
May	4,160	305	1,610	99,000
June	1,160	480	742	44,200
July	590	150	367	22,600
August	835	38	180	11,100
September	85	25	52.7	3,140
October	95	62	73.6	4,530
November, 1-13, 30	95	95	95.0	2,640
Total Recorded	.....	.....	.....	235,000
Monthly Flow for the Year of 1910:				
Januarv—a	.....	.....	40	2,460
February—a	.....	.....	50	2,780
March	1,860	396	1,060	65,200
April	319	117	197	11,700
May	217	138	167	10,300
June	161	38	103	6,130
July	38	0	15.3	940
August	0	0	0	0
September	27	0	9.0	536
October	27	7	20.8	1,280
November—d	51	27	34.2	2,040
December—a	.....	.....	25	1,540
Total Recorded	.....	.....	143	105,000
Monthly Flow for the Year of 1911:				
January—e	.....	.....	10	615
February—e	.....	.....	10	555
March—e	1,060	10	330	20,300
April	640	155	329	19,600
May	1,570	155	416	25,600
June	2,330	155	394	23,400
July	1,420	55	313	19,200
August	360	35	115	7,070
September	2,980	35	664	39,500
October	640	155	281	17,300
November—e	.....	.....	97	5,770
December—e	.....	.....	40	2,460
Total Recorded	2,980	.....	251	181,000
Mean Monthly Flow for the Period of Record:				
January	.....	.....	136	8,360
February	.....	.....	193	10,700
March	3,750	10	389	23,900
April	4,900	32	582	34,600
May	7,670	24	629	38,700
June	9,600	10	782	46,500
July	8,960	0	353	21,700
August	893	0	121	7,440
September	2.980	0	135	8,030
October	640	1	119	7,320
November	350	1	115	6,840
December	.....	0	87.0	5,350
Mean Yearly	9,600	0	303	219,000

a—Approximate.

b—Mean for part of the month taken as mean for the whole.

c—River dry after Nov. 16, 1906.

d—Nov. 26-30, 1910 estimated.

e—Estimated Jan. 1, to Mar. 8, and Nov. 8 to Dec. 31, 1911.

References for daily flow in U. S. G. S. Annual Reports 20 Part 4, 21 Part 4 and 22 Part 4; Water Supply papers Nos. 27, 37, 39, 49, 52, 66, 75, 84, 99, 130, 172, 208, 246, 266, 286 and 306.

MILK RIVER.

Observation Station Located in S. W. ¼ Sec. 17., T. 30 N., R. 32 E., at Malta, Mont.

Established in 1902.
Elevation of Station, 2,250 feet.
Elevation of Head Waters, 7,000 feet.
Drainage Area, 14,000 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1902:				
August	485	212	294	18,100
September	251	109	143	8,510
October	251	173	189	11,600
November, 1-8	...	...	178	2,820
Monthly Flow for the Year of 1903:				
January—a	.....	...	220	13,500
February—a	.....	...	220	12,200
March—a	.....	...	380	23,400
April	3,355	830	1,769	105,000
May	3,390	380	1,350	83,000
June	4,170	275	1,136	67,600
July—b	710	150	408	25,100
August—b	770	185	417	25,600
September	770	185	299	17,800
October	228	150	180	11,100
November	228	86	145	8,630
December	490	86	177	10,900
Total Recorded	4,170	...	558	404,000
Monthly Flow for the Year of 1904:				
January—a	.....	...	100	6,150
February—a	.....	...	80	4,600
March—a	.....	...	80	4,920
April—c	8,790	100	3,268	194,000
May	1,118	214	565	34,700
June	2,190	45	552	32,800
July	45	1	17	1,040
August	1	0	a1	61
September	0	0	0	0
October	0	0	0	0
November	45	0	14	833
December	24	15	15	922
Total Recorded	8,794	0	391	280,000
Monthly Flow for the Year of 1905:				
January—a	...	..	5	307
February—a	...	..	5	278
March	618	29	258	15,900
April	29	0	8	476
May	19	0	3.9	240
June	217	6	27	1,610
July	750	9	65	4,000
August	696	0	97	5,964
September	0	.	0	0
October	0	.	0	0
November	0	.	0	0
December	0	.	0	0
Total Recorded	.	0	39.1	28,800
Monthly Flow for the Year of 1906:				
April	39	0	10.0	595
May	1,330	0	159	9,780
June	10,900	1,100	4,150	247,000
July	2,000	39	399	24,500
August	39	12	22.8	1,400
September	412	19	63.4	3,770
October	129	19	31.6	1,940
November	87	69	73.5	4,370
Total Recorded	..	..	....	293,000
Monthly Flow for the Year of 1907:				
April	11,200	1,990	6,430	383,000
May	2,160	819	1,390	85,500
June	5,830	680	1,600	95,200
July	2,320	254	883	54,300
August	401	61	113	6,950
September	334	61	132	7,860

MILK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
October	218	110	133	8,180
November	145	74	102	6,070
Total Recorded	...	..	...	647,000
Monthly Flow for the Year of 1908:				
April—d	762	100	354	21,100
May	410	34	134	8,240
June	6,410	401	2,220	132,000
July	899	160	310	19,100
August	165	80	115	7,070
September	150	94	118	7,020
October	266	104	194	11,900
November	470	186	292	17,400
Total Recorded	...	...	...	224,000
Monthly Flow for the Year of 1909:				
April	1,200	247	547	32,500
May	4,860	404	1,830	113,000
June	6,980	545	1,940	115,000
July	2,040	320	913	56,100
August	1,050	80	363	22,300
September	186	52	79.9	4,750
October	116	52	82.5	5,070
November	116	65	88.9	5,290
Total Recorded	...	..	.....	354,000
Monthly Flow for the Year of 1910:				
January—a	...	...	50	3,070
February—a	...	..	55	3,050
March—a	...	..	1,700	105,000
April	570	34	166	9,880
May	116	29	50.2	3,090
June	116	1	24.8	1,480
July	2.5	0	.52	32
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December—a	...	0	.5	31
Total Recorded	...	0	171	126,000
Monthly Flow for the Year of 1911:				
January—e	...	...	10	615
February—e	...	...	10	555
March—e	758	129	246	15,100
April	346	31	131	7,800
May	1,280	44	384	23,600
June	725	15	183	10,900
July	1,540	26	319	19,600
August	216	16	85.3	5,240
September	6,860	31	1,730	103,000
October	630	257	392	24,100
November—e	199	...	104	6,190
December—e	...	...	50	3,070
Total Recorded	6,860	...	304	220,000
Mean Monthly Flow for the Period of Record:				
January	.....	.	77.0	4,730
February	.....	.	74.0	4,110
March	.....	.	533	32,800
April	11,200	0	1,410	83,900
May	4,860	0	652	40,100
June	10,900	1	1,310	78,000
July	2,320	0	368	22,600
August	1,050	0	151	9,280
September	6,860	0	257	15,300
October	630	0	120	7,380
November	470	0	93.4	5,560
December	...	0	49.4	3,040
Mean Yearly	11,200	0	425	307,000

a—Estimated.
b—Discharge estimated July 30 to August 7, 1903.
c—Discharge estimated April 1 to 10, 1904. d—Discharge estimated April 1 to 7, 1908.
e—Discharge estimated January 1 to March 24, and November 8 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 84, 99, 130, 172, 208, 246, 266, 286 and 306.

MILK RIVER.

Observation Station Located in T. 30 N., R. 36 E., at Hinsdale, Mont.

Established in 1908.
Elevation of Station, 2,120 feet.
Elevation of Head Waters, 7,000 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
May, 13-31	410	65	157	5,920
June	6,210	110	1,960	117,000
July	885	110	348	21,400
August	183	31	114	7,010
September	213	46	71.9	4,280
October	110	29	66.9	4,110
November, 1-18	180	85	133	4,750
Total Recorded	...	..	...	164,000
Monthly Flow for the Year of 1909:				
April	2,430	370	1,090	64,900
May	4,610	675	1,850	114,000
June	12,400	675	3,710	221,000
July	6,330	625	2,190	135,000
August	1,090	98	452	27,800
September	85	50	58.8	3,500
October	110	50	71.3	4,380
November	135	65	96.9	5,770
Total Recorded	...	..	....	576,000
Monthly Flow for the Year of 1910:				
January	.....	..	a55	3,380
February	.....	..	a60	3,330
March	.....	..	a2,500	154,000
April	1,380	86	581	34,600
May	103	34	73.8	4,540
June	103	13	63.1	3,750
July	13	.6	6.97	429
August	207	0	25.8	1,590
September	44	1.3	6.48	386
October	3.6	.6	2.07	127
November	3.6	..	a2.76	164
December	...	..	a3.0	184
Total Recorded	...	..	281	207,000
Monthly Flow for the Year of 1911:				
January	...	...	b10	615
February	.....	...	b10	555
March	1,170	...	b507	31,200
April	1,140	315	637	37,900
May	2,400	56	477	29,300
June	2,850	194	561	33,400
July	1,430	28	418	25,700
August	245	13	63.5	3,900
September	13,500	36	3,300	196,000
October	8,990	200	1,250	76,900
November	230	...	b118	7,020
December	...	...	b50	3,070
Total Recorded	13,500	...	616	446,000
Mean Monthly Flow for the Period of Record:				
January	.....	..	32.5	2,000
February	.....	..	35.0	1,940
March	.....	..	1,500	92,200
April	2,430	86	769	45,800
May	4,610	34	725	44,600
June	12,400	13	1,570	93,100
July	6,330	0.6	741	45,600
August	1,090	0	164	10,100
September	13,500	1,3	859	51,100
October	8,990	0.6	348	21,400
November	230	...	82.6	4,920
December	...	...	26.5	1,630
Mean Yearly	13,500	0	571	415,000

a—Discharge estimated by comparison with other Milk River stations January 1 to March 27, and November 13 to December 31, 1910.

b—Estimated January 1 to March 20, and November 8 to December 31, 1911.

Note—During 1905 two estimates were made of the Milk River at Hinsdale as follows: July 24, 40 sec.-ft.; August 12, 65 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 172, 246, 266, 286 and 306.

NORTH FORK OF MILK RIVER NEAR BROWNING, MONT.

This station, which is in the S. W. ¼ Sec. 10. T. 37 N., R. 11 W., about 35 miles north of Browning, was maintained during 1911. The following measurements were made:

May 8—Discharge .....31 second-feet
May 9—Discharge .....34 second-feet
June 8—Discharge .....30 second-feet
June 25—Discharge .....54 second-feet
August 28—Discharge .....20 second-feet

Reference: U. S. G. S. Water Supply Paper 306.

WEST FORK OF MILK RIVER.

Observation Station Located in N. W. ¼ Sec. 26, T. 33 N., R. 19 E., at Chinook, Mont.
Established in 1906.
Elevation of Station, about 2,400 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
April, 9-30	48	2	13.1	572
May	1,580	2	96.9	5,960
June	3,000	60	694	41,300
July	103	3	24.4	1,500
August	3	1	1.9	30
Total Recorded	.	.	...	49,400
Monthly Flow for the Year of 1907:				
March, 23-31	29	17	21.9	391
April	2,050	19	810	48,200
May	370	74	187	11,500
June	236	15	46.1	2,740
July	35	2	8.8	541
August	1	0	.19	12
Total Recorded	.	.	..	63,400

Note—Discharge measurements of the West Fork of Milk River in years other than 1906-7 have been made as follows:

1897—July 3, 93 sec.-ft.
1904—August 9, estimated 2 sec.-ft.
1905—July 18, estimated at 9 sec.-ft., below the head of the Reservation Ditch. (The remaining measurements are below all diversions). July 11, estimated 1 sec.-ft.; July 18, estimated 7 sec.-ft.; July 28-29, estimated 200 sec.-ft.; Aug. 2, 24 sec.-ft.; Aug. 8, 38 sec.-ft.; Aug. 10, 20 sec.-ft.; Aug. 11, estimated 15 sec.-ft.; Aug. 15 and 23, estimated 0.5 sec.-ft.
1908—May 5, 4.1 sec.-ft.; May 26, estimated 0.26 sec.-ft.; June 7, estimated 0.25 sec.-ft.

There was practically no flow January 1-March 22, and August 1 to December 31, 1907.
There was no flow after June 20, 1908, and very little at any time during the year.
Reference for daily flow in U. S. G. S. Annual Report No. 19, part 4, and Water Supply Papers Nos. 130, 172, 208 and 246.

NORTH FORK OF MILK RIVER.

Observation Station Located in Sec. 3, T 33 N., R. 19 E., Near Chinook, Mont.
Established in 1905.
Elevation of Station, 2,420 feet.
Drainage Area, about 1,420 square miles

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
April, 22–30	63	48	55	984
May	65	38	48	2,930
June	65	23	37	2,210
July	392	3	48	2,930
August	92	1	16	972
September	1	0	0	0
October	13	0	2.6	160
November—a	28	13	21	1,250
Total Recorded	392	0	..	11,400
Monthly Flow for the Year of 1906:				
March, 28–31	53	15	34.2	271
April	121	28	61.6	3,670
May	1,750	10	155	9,530
June	4,600	137	709	42,200
July	175	22	63.5	3,900
August	27	12	18.0	1,110
September	35	15	20.0	1,190
October	35	10	28.2	1,730
November	43	35	39.3	2,340
Total Recorded	..	..	....	65,900
Monthly Flow for the Year of 1907:				
March, 21–31	240	101	146	3,190
April	2,360	124	1,150	68,400
May	780	130	332	20,400
June	295	84	128	7,620
July	333	20	74.8	4,600
August	16	1	6.2	381
September	19	1	7.7	458
October	17	10	13.7	842
November	26	17	20.1	1,200
December, 1–8	25	22	23.9	379
Total Recorded	..	..	....	107,000
Monthly Flow for the Year of 1908:				
March—b	...	..	30.0	1,840
April	190	30	64.1	3,810
May	106	9	29.9	1,840
June	19	1	12.0	714
July	..	.	c0	0
August	..	.	c0	0
September	..	.	c0	0
October	..	.	c0	0
November—b, 20–30	..	.	15.0	328
December—b	..	.	10.0	615
Total Recorded	..	.	....	9,150
Monthly Flow for the Year of 1909:				
March, 23–31	68	24	42.7	762
April	119	32	59.9	3,560
May	1,320	51	209	12,900
June	3,570	24	407	24,200
July	1,770	30	290	17,800
August	38	1.2	14.2	873
September	2.1	1.2	1.23	73.2
October	12	2.1	7.73	475
November, 1–12	20	12	13.3	317
Total Recorded	..	..	....	61,000
Monthly Flow for the Year of 1910:				
January—d	...	..	10	615
February—d	...	..	12	666
March—d	991	..	332	20,400
April	87	34	58.2	3,460
May	31	7.8	14.9	916
June	7	0	2.3	137
July	.	.	0	0
August	.	.	0	0

NORTH FORK OF MILK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
September	.	.	0	0
October	.	.	0	0
November	.	.	0	0
December	.	.	0	0
Total Recorded	.	.	37.5	26,200
Monthly Flow for the Year of 1911:				
January	...	..	e0	0
February	...	..	e0	0
March	101	..	e19.1	1,170
April	206	27	81.9	4,870
May	74	28	48.5	2,980
June	37	1.8	13.3	791
July	14	0	2.46	151
August	0	0	0	0
September	3,220	0	437	26,000
October	56	29	40.9	2,510
November	37	..	e28.6	1,700
December	..	..	e10	615
Total Recorded	3,220	0	56.4	40,800
Mean Monthly Flow for the Period of Record:				
January	.....	..	5.0	307
February	.....	..	6.0	333
March	991	..	120	7,380
April	2,360	27	236	14,000
May	1,750	7.8	120	7,380
June	4,600	0	187	11,100
July	1,770	0	68.4	4,210
August	92	0	7.77	478
September	3,220	0	66.6	3,960
October	56	0	17.7	1,090
November	43	0	20.2	1,200
December	..	0	7.99	491
Mean Yearly	4,600	0	71.9	51,900

a—Mean of 27 days taken as mean for November, 1905.
b—Estimated.
c—Practically no flow in July, August, September and October, 1908.
d—January 1-March 6, 1910, estimated.
e—Estimated January 1 to March 22, and November 12 to December 31, 1911.
Reference for daily flow in U. S. G. S. Annual Report 19 part 4, and Water Supply Papers Nos. 172, 208, 246, 266, 286 and 306.

BEAVER CREEK.

Observation Station Located in Sec. 35, T. 31 N., R. 32 E., near Saco, Mont.
Established in 1903.
Elevation of Station, 2,200 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1904:				
April, 6-30	1,728	6	258	12,800
May, 1-6	5	1	4	48
Estimated Monthly Flow for the Year of 1905:				
March	54	0	7.2	428
June	170	0	34.3	2,040
July	98	4	24.1	1,480
August	90	0	10.0	615
The Year	.....	.....	.....	4,560
Estimated Monthly Flow for the Year of 1906:				
May, 25-31	1,500	30	846	11,700

BEAVER CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
June	6,650	44	1,510	89,800
July, 1-27	3,700	1	242	13,000
The Year	.....	.....	.....	114,500
Monthly Flow for the Year of 1909:				
March, 7-31	445	7	146	7,240
April	5	3.5	4.68	278
May	50	4	14.9	916
June	755	26	190	11,300
July	151	12	54.2	3,330
August	47	0	10.4	640
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total Recorded	.....	.....	.....	23,700
Monthly Flow for the Year of 1910:				
March	.....	0	a170	10,500
April	34	0.5	15.1	898
May	5	0	.05	3
June	0	0	0	0
July	0	0	0	0
August	23	0	1.74	107
Total Recorded	.....	.....	.....	11,500

a—Mar. 1-12, 1910 estimated on basis of high water marks.

During 1911 the flow from March to October was approximately 19,000 acre-feet, of which about 3,000 was during May, about 4,300 during June, about 7,300 during September and about 1,400 during October.

The station was established at Ashfield in 1903, but the records were unsatisfactory, so it was moved 2½ miles upstream.

This entire run-off does not pass the station during high stages, when records are kept of the second channel, known as Beaver Creek Overflow.

Measurements of discharge in other years have been as follows: July 22, 1903, 60 sec.-ft.; Aug. 16, 1903, 21.6 sec.-ft.; May 2, 1908, 1.8 sec.-ft.; May 12, 1908, 0.4 sec.-ft.; June 8, 1908, 0.01 sec.-ft.

The station was discontinued from August 30, 1096 to May 2, 1908.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 99, 130, 172, 208, 246, 266, 286 and 306.

BEAVER CREEK OVERFLOW.

Observation Station Located in S. ¼ Sec. 17, T. 30 N., R. 32 E., near, Bowdoin, Mont.
Established in 1903.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1903:				
July, 8-27	249	1	47	1,860
August, 3-8—a	3	1	2	24
Monthly Flow for the Year of 1904:				
April, 5-25—a	1,740	3	341	14;200
Monthly Flow for the Year of 1905:				
March, 3-8, 24-27	43	1	16	309
June, 6-30	138	3	33	1,630
July, 1-17, 29-31	31	1	8	333
August, 1-8—a	7	1	3	51
Total Recorded	.....	.....	.....	2,320

BEAVER CREEK OVERFLOW—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1906:				
May, 25–31	860	145	583	8,090
June, 1–7, 11–29—b	1,320	5	345	17,800
July, 1–12	1,160	1	160	3,810
Total Recorded	.....	.....	.....	29,700
Monthly Flow for the Year of 1909:				
March, 14–31	315	1.0	98.3	3,510
April	.2	0	0	0
May	0	0	0	0
June	956	0	137	8,150
July	57	0	12.1	744
August	0	0	0	0
Total Recorded	.....	.....	.....	12,400
Monthly Flow for the Year of 1910:				
March—c	.....	0	75.6	4,650
April	10	0	.70	42
The Year	.....	.....	.....	4,692

a—Dry for the rest of year.
b—On June 8–10, and June 30, 1906, the flow was probably in excess of 2,000 second-feet, and is not included above.
c—March 5–12, 1910, estimated on basis of high water marks.
There was no flow during 1908.
Gage heights were obtained each day from Mar. 20 to Nov. 11, 1911, but there were not sufficient discharge measurements made to obtain a rating the only measurements being 0 sec.-ft. on June 13, and 10 sec.-ft. on October 10.
Reference for daily flow in U. S. G. S. Water Supply papers, Nos. 99, 130, 172, 208, 246, 266, 286, and 306.

ROCK CREEK.

Observation Station Located in T. 31 N., R.36 E., 3½ Miles North of Hinsdale, Mont.
Established in 1906.
Elevation of Station 2,160 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
April	16	0	.83	49
May	3,080	0	225	13,800
June, 27 days	6,220	2	807	43,200
July, 1–12	77	0	38.6	916
Total Recorded	.....	.....	.....	58,000
Monthly Flow for the Year of 1907:				
April	5,520	102	1,900	113,000
May	1,530	201	832	51,200
June	630	65	150	8,930
July	65	.5	27.6	1,700
August	89	.5	3.49	242
September	201	0	25.7	1,530
Total Recorded	.....	.....	.....	177,000

Note—On July 5, 1905, the flow at this point which is just below the head of Rock Creek canal, was found to be 14 sec.-ft. On both July 24, and Aug. 12, 1905, it was estimated at 0.5 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208 and 246.

PORCUPINE CREEK.

Observation Station Located in N. W. ¼ Sec. 25, T. 28 N., R. 40 E., at Nashua, Mont.

Elevation of Station, 2,050 feet.
Established in 1908—(See note).
Character of Drainage Basin: Rolling prarie about 40 miles long.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 24-30	31	19.0	25	342
May	25	4.2	8.2	507
June	7.0	4.2	4.2	253
July	408	2.8	56	3,440
August	7.0	0	1.8	110
Total Recorded	.....	.....	.....	4,650
Monthly Flow for the Year of 1910:				
March	610	0	a296	18,200
April	240	10	82.1	4,890
May	10	0	31.0	1,910
June	10	0	5.36	319
July	2.8	0	.36	22
Total Recorded	.....	.....	.....	25,300
Monthly Flow for the Year of 1911:				
March, 19-31	8.5	1.0	5.3	137
April	83	.5	14.8	881
May	15	1.0	3.48	214
June	9.0	0	1.95	116
July	0	0	0	0
August	0	0	0	0
September	347	0	89.5	5,330
October	347	15	53.1	3,260
Total Recorded	.....	.....	.....	9,940

a—Estimated March 1-12.
Note—There was no flow in 1908 after the station was established on July 11.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.

PARADISE VALLEY CANAL.

Observation Station Located 7 Miles Below Chinook, Mont.

Established in 1903—(See note).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1904:				
May, 11-31	16	0	8	333
June	15	0	4	238
July	10	2.5	8	492
August	6	0	3	184
October, 11-20	2	0	1	20
Total Recorded	.....	.....	.....	1,270
Monthly Flow for the Year of 1905:				
March, 26-31	4	1	2	24
April	17	0.5	9	536
May	19	4	10	615
June	16	4	7	417
July	17	2	6	369
August	1	0.1	.4	13
Total Recorded	.....	.....	.....	1,970

PARADISE VALLEY CANAL—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
April, 8–30	9.1	0.9	3.7	169
May	18.0	.4	4.0	246
June	19.4	.0	5.6	333
July	13.8	3.6	7.7	474
August, 1–15	5.4	.0	2.7	80
Total Recorded	.....	.....	.....	1,300
Monthly Flow for the Year of 1907:				
May, 9–31	7.7	0.3	4.00	182
June	12.2	.0	1.54	92
July	9.1	.0	1.89	116
August	9.7	1.5	5.38	331
September	7.2	.4	2.18	130
October	2.9	1.2	2.07	127
Total Recorded	.....	.....	.....	978
Monthly Flow for the Year of 1908:				
April, 5–30	22	1.0	13.9	717
May	16	5.0	8.97	552
June	14	.0	2.20	131
July	22	5.0	7.71	474
August	8	.0	5.03	309
Total Recorded	.....	.....	.....	2,180
Monthly Flow for the Year of 1909:				
May	16.3	0.2	8.40	516
June	28	.0	6.67	397
July	23.2	.0	4.86	299
August, 1–7	13.8	.1	5.01	69.6
Total Recorded	.....	.....	.....	1,280
Monthly Flow for the Year of 1911:				
April, 22–30	23	5	15.3	273
May	28	4.2	12.3	756
June	32	.5	9.29	553
July	21	.0	9.78	601
August	10	.0	1.55	95
Total Recorded	.....	.....	.....	2,280

Source of Supply—Milk River.

Note—Gage heights were published for part of 1903, but a rating was not obtained until 1904. The following measurements were made: June 26, 1903, 16.8 sec.-ft.; and Aug. 20, 1903, 0.5 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 99, 130, 172, 208, 246, 266, and 306.

COOK CANAL.

Observation Station Located in N. W. ¼ Sec. 30, T. 33 N., R. 20 E., Near Chinoook, Mont.

Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
April	.....	.....	a37.0	2,200
May	50	0	15.5	953
June	33	0	16.5	982
July	25	0	4.5	277
August, 1–12	21	0	9.0	214
Total Recorded	.....	.....	.....	4,630
Monthly Flow for the Year of 1906:				
April, 4–30	27.5	0.0	5.9	316
May	57.0	.0	9.5	584
June, 16 days	44.0	16.5	26.0	826
July	32.5	9.3	22.2	1,360
August	12.0	6.1	9.0	553
September	5.2	1.8	2.7	161
Total Recorded	.....	.....	.....	3,000
Monthly Flow for the Year of 1907:				
July	12.0	1.5	6.58	405
August, 1–20	8.6	.5	5.02	193
Total Recorded	.....	.....	.....	604
Monthly Flow for the Year of 1908:				
April, 8–30	37	2	17.5	798
May	32	2	17.1	1,050
June	28	1	7.30	434
July	13	.0	3.26	200
August	5	.0	1.58	97
Total Recorded	.....	.....	.....	2,580
Monthly Flow for the Year of 1909:				
April, 18–30	19.6	15.7	17.9	462
May	23.8	2.5	16.8	1,030
June	18.9	.8	11.2	666
July	9.9	0	2.51	154
August	8.8	0	2.10	129
Total Recorded	.....	.....	.....	2,440
Monthly Flow for the Year of 1910:				
April, 15–30	21	21	a21	666
May	18.5	4.9	10.5	646
June, 1–8	4.4	.2	2.12	34
Total Recorded	.....	.....	.....	1,350
Monthly Flow for the Year of 1911:				
April, 23–30	52	34	42.9	680
May	54	1.8	31.0	1,910
June	40	1.6	14.0	833
July	3.8	.0	.59	36
Total Recorded	.....	.....	.....	3,460

a—Estimated.

Source of Supply—North Fork of Milk River.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246, 266, 286 and 306.

MATHESON CANAL.

Observation Station Located in N. W. ¼ Sec. 29, T. 33 N., R. 20 E., Near Chinook, Mont.

Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
April	27	6.0	19.0	1,130
May	28	3.0	11.0	676
June	12	6.0	9.0	536
July	9	.5	3.5	215
August, 1–22	1	0	.4	17
Total Recorded	.....	.....	.....	2,570
Monthly Flow for the Year of 1906:				
April, 29 days	15.3	1.0	5.8	334
May	17.7	0	5.5	338
June	28.0	2.3	9.3	553
July	16.0	.0	3.4	209
August	6.1	.0	1.6	98
September	7.3	1.6	5.1	304
Total Recorded	.....	.....	.....	1,840
Monthly Flow for the Year of 1908:				
April, 8–30	16	3.0	10.5	479
May	6	.0	2.97	183
June	8	1.0	3.77	224
July	2	.0	.419	26
August	3	.0	.806	50
Total Recorded	.....	.....	.....	962
Monthly Flow for the Year of 1909:				
April, 2–30	12.5	2.9	7.02	404
May	13.0	5.2	8.01	493
June	13.1	.3	5.04	300
July	9.4	.0	1.95	120
August	1.2	.0	.04	2.5
Total Recorded	.....	.....	.....	1,320
Monthly Flow for the Year of 1910:				
April, 18–30	5.0	3.0	a4.0	103
May	5.2	.9	1.73	106
June, 1–16	5.8	.5	2.45	78
Total Recorded	.....	.....	.....	287
Monthly Flow for the Year of 1911:				
March, 27–30	.....	.....	b	30
April	.....	.....	b8.9	491
May	7.8	.9	4.83	297
June	5.6	.3	2.29	136
July	2.6	.0	1.28	79
Total Recorded	.....	.....	.....	1,030

a—Estimated.
b—Estimated by ditch rider for Mar. 27 to Apr. 22, 1911.
Source of Supply—North Fork of Milk River.
Note—There was practically no flow during 1907.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172, 208, 246, 266, 286 and 306.

RESER DITCH.

Observation Station Located 11 Miles Northwest of Chinook, Mont.

Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
April, 9-30—a	.....	.....	3.0	131
May—a	.....	.....	3.0	184
June, 1-15—a	.....	.....	3.0	90
July	8	0	1.5	92
August	7	0	1.9	114
Total Recorded	.....	.....	.....	611

a—Estimated.
Two measurements were made in 1906: April 28, 1.6 sec.-ft.; June 6, 8.5 sec.-ft.
Source of Supply—West Fork of Milk River.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172 and 208.

WEST FORK DITCH.

Observation Station Located 4 Miles North of Chinook, Mont.

Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
June	8.5	0	4.2	250
July	13.0	0	2.9	179
August	13.0	0	5.9	364
Total Recorded	.....	.....	.....	793
Monthly Flow for the Year of 1906:				
May, 2 days	.....	.....	24.0	95
June, 12 days	26	2	17.9	426
July, 7 days	11	2	8.0	111
Total Recorded	.....	.....	.....	632

Source of Supply—West Fork of Milk River.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 172 and 208.

HARLEM CANAL.

Observation Station Located in S. W. ¼ Sec. 33, T. 33 N., R. 21 E., Near Zurich, Mont.
Established in 1903—(See note).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1904:				
May, 11–31	50	28	41	1,710
June	56	15	35	2,083
July	21	0	4	246
August, 1–13	2	0	1	26
Total Recorded	.....	.....	.....	4,060
Monthly Flow for the Year of 1905:				
March, 5–31	38	0	25.5	1,370
April	32	6	18	1,070
May	27	7	16	984
June	19	2	9	536
July	73	3	20	1,230
August, 1–19	26	0	10	377
Total Recorded	.....	.....	.....	5,570
Monthly Flow for the Year of 1906:				
April, 9–30	53	0.3	18.0	785
May	91	.3	21.2	1,300
June, 1–7—a	80	22.0	54.6	758
Total Recorded	.....	.....	.....	2,840
Monthly Flow for the Year of 1908:				
April, 7–30	71	12	49.0	2,330
May	78	50	59.8	3,680
June	79	3	32.2	1,920
July	31	14	27.6	1,700
August	24	5	13.5	830
Total Recorded	.....	.....	.....	10,500
Monthly Flow for the Year of 1909:				
April	84	58	71.4	4,250
May	77	0	53.1	3,260
June	68	0	31.1	1,850
July	59	0	19.5	1,200
Total Recorded	.....	.....	.....	10,600
Monthly Flow for the Year of 1910:				
March, 10–31	67	56	61.4	2,680
April	67	51	60.4	3,590
May	69	51	59.1	3,630
June, 1–10	51	42	45.5	903
Total Recorded	.....	.....	.....	10,800
Monthly Flow for the Year of 1911:				
March, 19–31	78	13	54.8	1,410
April	78	22	66.3	3,950
May	82	27	63.2	3,890
June	61	30	41.9	2,490
July	62	0	22.8	1,400
August, 1–22	6	3	4.3	188
Total Recorded	.....	.....	.....	13,300

a—Dam washed out June 8, 1906.
Source of Supply—Milk River.
Note—Daily gage heights were not recorded until 1904. The following measurements were made during 1903: June 27, 37.1 sec.-ft.; July 27, 31.2 sec.-ft.; July 27, 31.4 sec.-ft., and Aug. 19, 4 sec.-ft.
The canal was not in use during 1907, as the headgates were out of order.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 99, 130, 172, 208, 246, 266, 286 and 306.

AGENCY DITCH.

Observation Station Located in S. W. ¼ Sec. 33, T. 32 N., R. 23 E., Near Harlem, Mont.
Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
July, 8–31	63	0	23	1,050
August	33	5	18	1,110
September, 1–8	5	1	3	48
Total Recorded	.	.	.	2,210
Estimated Monthly Flow for the Year of 1910:				
April, 8–30	..	..	60	2,740
May, 1–9	..	..	60	1,070
June, 2–30	..	..	37	2,130
July, 1–27	..	..	25	1,340
Total Recorded	..	..	..	7,280
Monthly Flow for the Year of 1911:				
March, 26–31	.	.	a..	238
April	..	..	a75	4,460
May	0	0	0	0
June	89	0	37.7	2,240
July	82	0	44.4	2,730
Total Recorded	..	.	....	9,670

a—Estimated March 26 to April 25, 1911.
Source of Supply: Milk River.
Note—During 1906–1909 discharge measurements were made as follows:
1906—April 10, 49.8 sec.-ft.; April 21, 10.6 sec.-ft.; April 27, 23.6 sec.-ft.; May 10. 48.1 sec.-ft.; July 21, 6.5 sec.-ft.
1907—May 18 and 24, 0 sec.-ft.; July 11, 6.9 sec.-ft.; July 19, 19.2 sec.-ft.; Aug. 2. 0 sec.-ft.; Aug. 27, 11.8 sec.-ft.; Sept. 28, 19.4 sec.-ft.
1908—April 4, 0 sec.-ft.; April 24, 37.2 sec.-ft.; May 8, 17.0 sec.-ft.; May 28, 37.9 sec.-ft.; Aug. 11, 13.2 sec.-ft.
1909—June 28, discharge 11 sec.-ft.
Reference for daily flow in U. S. G. S. Water Suply Papers Nos. 172, 208, 246, 266, 286 and 306.

FORT BELKNAP CANAL.

Observation Station Located in S. E. ¼ Sec. 20, T. 33 N., R. 18 E., Near Chinook, Mont.
Established in 1903.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1903:				
June, 21 to 30	107	87	100	1,980
July, 1 to 4	92	87	90	714
Total Recorded	..	..	..	2,690
Monthly Flow for the Year of 1904:				
May, 9 to 31	125	45	91	4,150
June	115	18	61	3,630
July, 1 to 23	70	24	46	2,100
Total Recorded	..	..	..	9,880
Monthly Flow for the Year of 1905:				
March, 27–31	100	82	89	883
April	82	54	66	3,930
May	79	36	60	3,690
June	60	16	32	1,900
July	130	3	33	2,030
August	65	1	25	1,540
Total Recorded	..	..	..	14,000

FORT BELKNAP CANAL—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
April, 1-27	163	15	95.9	5,140
May, 21-31	237	43	127	2,770
June, 1-6	130	130	130	1,550
July, 1-28	147	7	50.9	2,830
Total Recorded	...	..	...	12,300
Monthly Flow for the Year of 1907:				
May, 12-18	102	62	77.4	1,070
July	78	22	38.8	2,390
August	75	39	62.0	3,810
September, 1-21	62	16	36.7	1,530
Total Recorded	..	..	....	8,800
Monthly Flow for the Year of 1908:				
April, 10-30	120	22	105	4,370
May	126	76	102	6,270
June	110	85	87.7	5,220
July	109	70	90.4	5,560
August	70	52	60.4	3,710
September, 1-23	56	43	46.2	2,110
Total Recorded	..	..	....	27,200
Monthly Flow for the Year of 1909:				
April, 11-30	89	74	82.1	3,260
May	89	41	62.8	3,860
June	80	0	47.7	2,840
July	54	0	40.4	2,480
August	43	16	32.5	2,000
September	30	12	21.1	1,260
October	26	20	23.7	1,460
November, 1-13	24	18	19.9	513
Total Recorded	..	..	....	17,700
Monthly Flow for the Year of 1910:				
March, 19-31	..	..	32.8	845
April	..	..	63.0	3,750
May	81	67	68.8	4,240
June, 16 days	75	56	67.0	2,130
Total Recorded	..	..	....	11,000
Monthly Flow for the year of 1911:				
March, 25-31	...	..	a...	450
April	...	..	a109	4,250
May	116	45	88.3	5,430
June	80	27	47.3	2,810
July	66	28	48.0	2,950
August	50	16	34.0	2,090
September	21	0	2.87	171
Total Recorded	..	..	....	18,200

a—Estimated March 25 to April 20, 1911.
Source of Supply: Milk River.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 99, 130, 172, 208, 216, 266, 286 and 306.

WINTER ANDERSON CANAL

Observation Station Located Five Miles East of Chinook, Mont.

Established in 1906.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
April, 23-30	3.6	2.8	3.0	48
May	20.2	.0	2.1	129
June	68	4.7	14.9	887
July	4.6	.2	1.2	74
Total Recorded	...	...	...	1,140
Monthly Flow for the Year of 1908:				
April, 25-28	.	.	1.50	12
May, 16 days	7	1	3.12	99
June, 20 days	24	1	6.85	272
Total Recorded	..	.	....	383

Source of Supply: Milk River.
Note:—The canal was not in use during 1907.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 208 and 246.

ROCK CREEK CANAL.

Observation Station Located 3½ Miles North of Hinsdale, Mont.

Established in 1905.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
July	48	1	22	1,350
August	41	0	7.3	438
Total Recorded	..	.	..	1,790

Other measurements have been made as follows:
July 9, 1906, 13.1 sec.-ft.; July 22, 1906, a8.0 sec.-ft.; August 14, 1906, a 1.0 sec.-ft.; July 31, 1907, 3.1 sec.-ft.; August 28, 1907, 2.8 sec.-ft.; October 21, 1907, a1.5 sec.-ft.
a—Estimated.
Source of Supply: Rock Creek.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 172, 208 and 246.

Flood Discharges in the Milk River Basin.

The U. S. G. S. Water Supply paper 208 gives estimated flood discharges of streams in the Milk River basin for June 1906.

LITTLE PORCUPINE CREEK.

Observation Station Located in Sec. 28, T. 28 N., R. 43 E., 2 Miles South of Frazer, Mont.

Established in 1908. See Note.

Character of Drainage Basin: A Narrow strip of land about 25 miles long.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
January	0	0	0	0
February	0	0	0	0
March	57	0	5.8	357
April	43	0	6.4	381
May	0	0	0	0
June	0	0	0	0
July	315	0	31	1,910
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total Recorded	315	0	3.6	2,650

LITTLE PORCUPINE CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
March	204	0	a83.8	5,150
April	50	0	21.2	1,260
May	1.5	0	.05	3
June	69	0	3.60	214
Total for Year	..	.	...	6,630
Monthly Flow for the Year of 1911(b).				
September	195	0	31.4	1,870
October	35	4.1	11.7	719
Total Recorded	..	...	....	2,590

a—Estimated March 1 to 10, 1910.
b—Practically no flow January 1 to September 5, 1911.
Note:—From July 13 to December 31, 1908, the flow averaged less than 0.5 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

WOLF CREEK.

Observation Station Located in S. W. ¼ Sec. 8, T. 27 N., R. 47 E., at Wolf Point, Mont.
Established in 1908. See Note.
Elevation of Station, 2,000 ft.
Character of Drainage Basin: Rolling prairie.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
March, 19–31	52	21.5	47.3	1,220
April	21.5	3.3	10.2	607
May	4.3	.1	1.57	97
June	7.7	4.3	6.68	397
July	15.8	2.9	8.49	522
August	2.9	.0	.19	12
September	0	.0	.0	0
October	2.9	.0	1.22	75
November, 1–15	1.8	.8	1.40	42
Total Recorded	...	..	....	2,970
Monthly Flow for the Year of 1910:				
January	..	...	0	0
February	..	...	0	0
March	..	...	a54.1	3,330
April	29	4.4	14.0	833
May	3.7	2.3	2.76	170
June	3.7	2.3	2.49	148
July	2.7	.1	.41	25
August	.2	.1	.12	7
September	.2	.1	.12	7
October	..	...	0	0
November	...	...	0	0
December	..	...	0	0
Total Recorded	..	..	6.17	4,520
Monthly Flow for the Year of 1911:				
January	..	...	0	0
February	..	...	0	0
March	154	8.5	b60.9	3,740
April	8.5	5.5	7.65	455
May	8.0	1.3	4.33	266
June	14	1.3	6.66	396
July	14	0.2	3.29	202
August	0.2	.0	.11	6.8
September	107	0.2	55.4	3,300
October	8	3.5	7.13	438
November	.	...	b5.97	355
December	.	...	b2.0	123
Total Recorded	154	0	12.8	9,280

WOLF CREEK —(Continued).

a—Estimated March 1 to 12, 1910.
b—Estimated March 1 to 18, and November 12 to December 31, 1911.
Note:—From August 15 to December 31, 1908, the flow probably averaged less than 0.5 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

WOLF POINT DITCH.

At Wolf Point, Mont.

Established in 1909.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
May, 9–29	6.1	3.1	3.96	165
June, 17–29	1.0	.2	.69	18
July	.5	.0	.17	10
August	.1	.0	.06	4
September	.2	.0	.073	4
October	2.3	.1	.98	60
November, 1–13	3.1	2.3	2.79	72
Total Recorded	...	...	....	333

Note—Measurements were made in 1911 as follows: April 18, 0.5 sec.-ft.; May 17, 1.7 sec.-ft.; and June 15, 1.8 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 266 and 306.

POPLAR RIVER.

Observation Station Located in S. E. ¼ Sec. 5, T. 21 N., R. 51 E., Near Poplar, Mont.

Established in 1908. See Note.
Drainage Area, 3,660 square miles.
Character of Drainage Basin: Rolling prairie cut by small coulees.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
March, 23–31	79	30	49.9	891
April	331	52	190	11,300
May	150	30	78.1	4,800
June	79	30	52.9	3,150
July	381	30	158	9,720
August	65	15	39.5	2,430
September	15	10	12.8	762
October	30	15	17.5	1,080
November, 1–12	30	22	25.3	602
Total Recorded	..	..	....	34,700
Monthly Flow for the Year of 1910:				
January	...	...	a15.0	922
February	...	...	a15.0	833
March	...	...	a600	36,900
April	418	110	229	13,600
May	94	28	58.1	3,570
June	36	15	26.0	1,550
July	15	2	11.1	682
August	15	2	7.74	476
September	15	15	15.0	893
October	15	9.5	13.4	824
November	..	..	b18.7	1,110
December	..	..	a15.0	922
Total Recorded	..	..	85.3	62.300
Monthly Flow for the Year of 1911:				
May	126	40	70.0	4,300
June	215	35	85.6	5,090

POPLAR RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
July	136	21	39.9	2,450
August	99	21	37.6	2,310
September	465	17	174	10,400
Total Recorded	...	..	...	24,600

a—Estimated by comparison with Big Muddy River near Culbertson.
b—Estimated November 15 to 30, 1910.
Note:—Gage heights are published for September 2 to November 11, 1908, but the only omeasurement of discharge made that year was 9.9 sec.-ft. on August 15.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

BIG MUDDY RIVER.

Observation Station Located in S. W. ¼ Sec 17, T. 29 N., R. 54 E., Near Culbertson, Mont.

Established in 1908. See Note.
Character of Drainage Basin: Rolling prairie cut by small coulees.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 20-30	200	47	109	2,380
May, 1-25	64	32	43.2	2,140
July	22.3	18.7	20.4	526
August	26.3	6.6	17.1	1,050
September	6.6	.3	1.28	76
October	.7	.5	.61	38
November, 1-12	.5	.3	.38	9
Total Recorded	.....	..	...	6,220
Monthly Flow for the Year of 1910:				
January	...	...	0	0
February	...	...	0	0
March	460	...	a326	20,000
April	129	6.5	46.9	2,790
May	5.8	2.5	3.69	227
June	55	2.5	9.80	583
July	7.3	.5	2.39	147
August	.6	.5	.54	33
September	.6	.3	.44	26
October	...	...	0	0
November	...	...	0	0
December	...	...	0	0
Total Recorded	...	...	32.5	23,800
Monthly Flow for the Year of 1911:				
January	...	.	b0	0
February	...	.	b0	0
March	...	.	b25.5	1,570
April	280	8	109	6,490
May	18	7	10.4	640
June	39	12	26.8	1,590
July	39	4.5	14.7	904
August	64	6	23.9	1,470
September	144	11	50.9	3,030
October	172	6	34.9	2,150
November	...	.	b3.4	202
December	...	.	b.0	0
Total Recorded	280	.	24.9	18,000

Note:—Gage heights are published for September 1 to December 5, 1908, but the only measurement of discharge made that year was 6.3 sec.-ft. on August 16.
a—Discharge estimated March 1 to 5, 1910.
b—Estimated January 1 to March 26, and November 8 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

Miscellaneous Measurements in Missouri River Drainage Basin in Montana.

MISSOURI RIVER AND HEADWATERS.

Date.	Stream.	Tributary to—	Locality.	Discharge Sec.-ft.
July 12, 1911	Red Rock River	Beaverhead	Twitchells Ranch near Monida	140
July 20, 1910	do	do	Six miles above Lima	75
Aug. 1, 1910	do	do	do	85
Aug. 15, 1910	do	do	do	106
Sept. 6, 1890	do	do	Allerdice	10
Aug. 19, 1889	Jefferson River	Missouri	Willow Creek	202
July 27, 1872	do	do	Three Forks	3,780
Oct. 15, 1889	do	do	do	333
Aug. 24, 1894	do	do	do	808
July 27, 1872	Missouri River	do	do	8,540
July 28, 1890	do	do	do	2,860
Aug. 6, 1890	do	do	Gallatin	2,640
April 8, 1890	do	do	Toston	3,840
May 6, 1890	do	do	do	12,400
May 13, 1890	do	do	do	14,400
June 6, 1890	do	do	do	13,700
July 4, 1890	do	do	do	6,840
July 26, 1890	do	do	do	3,700
July 31, 1872	do	do	French Bar (71 miles below Three Forks	10,000
....., 1882,	do	do	Stubb's Ferry (73 miles below Three Forks	3,770
....., 1882	do	do	Just below mouth of Sun River	19,400
Sept. 11, 1904	do	do	Great Falls	2,810
May 30, 1905	do	do	do	6,100
June 15, 1905	do	do	do	12,300
Oct. 7, 1905	do	do	do	1,950
....., 1878	do	do	Twelve miles below Judith River	11,100
Oct. 20, 1882	do	do	Thirty miles above mouth of Musselshell River	7,300
Sept. 4, 1889	Blacktail Deer Creek	Beaverhead	Poindexter	10
Sept. 4, 1889	Ruby River	do	Laurin	90
Sept. 8, 1889	Big Hole River	Jefferson	Melrose	60
Oct. 14, 1910	Whitetail Creek	do	One mile above mouth of Little Whitetail	3.54
Aug. 17, 1889	Madison River	Missouri	Blacks'	1,100
Apr. 4, 1890	Hot Spring Creek	Madison	Red Bluff	about 5
June 3, 1899	Cherry Creek	do	do	366
June 8, 1900	do	do	do	147
June 19, 1900	do	do	do	66
June 25, 1900	do	do	do	49
July 13, 1900	do	do	do	7
Aug. 16, 1900	do	do	do	9
April 22, 1901	do	do	do	92
April 22, 1901	do	do	do	83
June 6, 1901	do	do	do	95
April 19, 1903	do	do	do	56
May 23, 1903	do	do	do	116
June 11, 1903	do	do	do	292
June 26, 1903	do	do	do	137

Date.	Stream.	Tributary to—	Locality.	Discharge Sec.-ft.
July 15, 1903	Cherry Creek	Madison	Red Bluff	58
Sept. 4, 1903	do	do	do	6
Oct. 16, 1903	do	do	do	18
Apr. 19, 1904	do	do	do	77
May 14, 1904	do	do	do	80
June 14, 1904	do	do	do	130
July 6, 1904	do	do	do	73
July 19, 1904	do	do	do	20
Aug. 23, 1904	do	do	do	13
Oct. 28, 1904	do	do	do	12
Apr. 1, 1905	do	do	do	16
May 2, 1905	do	do	do	23
May 17, 1905	do	do	do	36
June 13, 1905	do	do	do	155
July 5, 1905	do	do	do	38
Aug. 3, 1905	do	do	do	11
Sept. 2, 1905	do	do	do	14
Sept. 26, 1905	do	do	do	14
Oct. 22, 1905	do	do	do	15
Nov. 18, 1905	do	do	do	9
May 19, 1897	Spanish Creek	Gallatin	Gallatin Canyon	164
Sept. 3, 1904	Big Bear Creek	do	Near Bozeman	4.8
Oct. 24, 1904	do	do	do	4.0
Sept. 3, 1904	Little Bear Creek	do	do	1.9
Oct. 24, 1904	do	do	do	1.5
Aug. 5, 1904	Cottonwood Creek	do	do	37.5
Sept. 3, 1904	do	do	do	24.2
Oct. 24, 1904	do	do	do	16.8
May 12, 1897	Rocky (canon) Creek	East Gallatin	do	143
May 29, 1897	do	do	do	74
June 22, 1897	do	do	do	38
July 10, 1897	do	do	do	23
July 25, 1897	do	do	do	24
Aug. 9, 1897	do	do	do	15
Sept. 11, 1897	do	do	do	12
Aug. 20, 1905	do	do	do	10.6
Sept. 8, 1905	do	do	do	7.6
Oct. 26, 1905	do	do	do	10.8
Aug. 3, 1889	Bridger Creek	do	Canyon	25
Sept. 3, 1904	do	do	Near Bozeman	3.5
Oct. 25, 1904	do	do	do	7.1
Aug. 23, 1904	Pass Creek	Dry Cr.—E. Gallatin	do	5.4
Sept. 10, 1904	do	do	do	5.9
June 19, 1905	Sixteen Mile Creek	Missouri	Lombard	53
Aug. 16, 1905	do	do	do	19
Sept. 22, 1905	do	do	do	16
July 10, 1906	do	do	do	20
July 13, 1910	do	do	do	34
Oct. 1, 1910	Crow Creek	do	Townsend	29
Sept 30, 1910	Deep Creek	do	do	17.4
May 12, 1911	do	do	do	45

DEARBORN RIVER DRAINAGE.

Date.	Stream.	Tributary to—	Locality.	Discharge Sec.-ft.
Aug. 9, 1889	Dearborn River	Missouri	Dearborn	47
Apr. 15, 1890	.....do	.....do	.....do	37
....., 1882	.....do	.....do	Near mouth	622
May 5, 1908	Springs	Dearborn	Clemons	10
Jan. 16, 1911	.....do	.....do	.....do	13
Mar. 20, 1911	Middle Fork Dearborn	.....do	Stearns	26
June 6, 1911	.....do	.....do	.....do	94
....., 1882	Smith River (Deep Cr.)	Missouri	Probably near mouth	1,800

SUN RIVER DRAINAGE.

Nov. 9, 1905	N. Fk. of N. Fk Sun	N. Fk. Sun	Dam site Reservoir No. 3	47
Oct. 23, 1911	.....do	.....do	One mile above fork	127
Oct. 22, 1911	N. Fk. of Sun	Sun River	At canyon near Augusta	346
....., 1882	Sun River	Missouri	Near mouth	4,270
Nov. 10, 1905	S. Fk. of N. F. of Sun	N. Fk. Sun	Dam site Reservoir No. 3	59
Oct. 23, 1911	.....do	.....do	One mile above fork	137
Nov. 10, 1905	Bear Creek	S. Fk. of N. Fk. of Sun	One mile above mouth	3.8
Nov. 7, 1905	Ford Creek	Smith Creek		4.4
Mar. 20, 1911	Elk Creek	S. Fk. of Sun River	At highway bridge near Augusta	20
June 7, 1911	.....do	.....do	.....do	141
July 5, 1897	Giant Springs	Missouri	Great Falls	*256
Sept. 11, 1904	.....do	.....do	.....do	*202
Sept. 14, 1912	.....do	.....do	.....do	*192

MARIAS RIVER DRAINAGE.

June, 7, 1900	Two Medicine Creek	Marias	Outlet of lower lake	390
May 29, 1900	.....do	.....do	Ford, 12 miles below Piegan	1,260
May 28, 1900	Badger Creek	Two Medicine	Two miles above Piegan	562
May 24, 1908	.....do	.....do	Ford at Piegan	273
June 9, 1900	N. Fk Cutbank Creek	Cutbank Creek	Base of mountains	231
June 8, 1900	Cutbank Creek	Marias	Ford of road to St. Mary Lake	488
May 26, 1900	Birch Creek	.....do	Four miles above Robare	387
May 26, 1900	.....do	.....do	One half mile above Robare	392
Aug. 31, 1908	Willow Creek	Teton	Belleview	7.9

JUDITH RIVER DRAINAGE.

May 4, 1911	Spring Creek	Judith	At Lewistown	185
Sept 9, 1910	Warm Spring Creek	.....do	At mouth near Lewistown	142

MUSSELSHELL RIVER DRAINAGE

Date.	Stream.	Tributary to—	Locality.		Discharge Sec.-ft.
Aug 17, 1889	N. Fork Musselshell	Musselshell	Martinsdale	..	15
Aug 17, 1889	Big Elk Creek	.....do	Big Elk	..	10
Aug 17, 1889	American Fork	.....do	Big Timber Road	..	3
Aug 17, 1889	Lebo Creek	American Fork	.....do	..	8
June 7, 1906	Coulee Creek	Musselshell	Lavina	a	35
Aug. 17, 1889	South Fork Musselshell	.....do	Martinsdale	..	10
June 6, 1909	Cottonwood Creek	S. Fk. Musselshell	.....do	..	**4.9**

MILK RIVER DRAINAGE.

June 14, 1900	S. Fork Milk	Milk	Pauls' ranch	..	31
Aug. 7, 1901	.....do	.....do	Murphy's ranch	..	35
July 15, 1904	Milk River	Missouri	Coutts	..	62
Aug. 9, 1904	.....do	.....do	Yantic	..	2.9
July 1, 1905	.....do	.....do	.....do	a	0.2
July 12, 1905	.....do	.....do	.....do	a	0.2
July 20, 1905	.....do	.....do	.....do	a	0.3
July 28, 1905	.....do	.....do	.....do	a	0.5
July 29, 1905	.....do	.....do	.....do	a	60
Aug. 3, 1905	.....do	.....do	.....do	a	4.0
Aug 8, 1905	.....do	.....do	.....do	a	1.0
Aug. 15, 1905	.....do	.....do	.....do	a	0.2
Aug. 23, 1905	.....do	.....do	.....do	..	0
May 25, 1897	.....do	.....do	Chinook	..	110
July 3, 1897	.....do	.....do	.....do	..	460
Nov. 10, 1897	.....do	.....do	.....do	..	34
Aug. 9, 1904	.....do	.....do	.....do	..	3.0
June 17, 1905	.....do	.....do	.....do	a	3.0
June 24, 1905	.....do	.....do	.....do	a	3.0
July 8, 1905	.....do	.....do	.....do	..	136
July 15, 1905	.....do	.....do	.....do	..	8.0
July 21, 1905	.....do	.....do	.....do	a	7.0
July 27, 1905	.....do	.....do	.....do	a	450
Aug. 5, 1905	.....do	.....do	.....do	a	200
Aug. 11, 1905	.....do	.....do	.....do	..	53
Aug. 19, 1905	.....do	.....do	.....do	a	8
June 21, 1910	.....do	.....do	.....do	..	33
July 9, 1910	.....do	.....do	.....do	..	35
Aug. 8, 1904	.....do	.....do	Zurich	..	2.3
June 17, 1905	.....do	.....do	.....do	a	1.5
June 24, 1905	.....do	.....do	.....do	a	2.0
July 8, 1905	.....do	.....do	.....do	..	180
July 15, 1905	.....do	.....do	.....do	a	5.0
July 21, 1905	.....do	.....do	.....do	a	4.0
July 27, 1905	.....do	.....do	.....do	a	350
Aug. 5, 1905	.....do	.....do	.....do	..	209
Aug. 11, 1905	.....do	.....do	.....do	..	35

MILK RIVER DRAINAGE—(Continued).

Date.	Stream.	Tributary to—	Locality.		Discharge Sec.-ft.
Aug. 19, 1905	Milk River	Missouri	Zurich	a	6.0
Apr. 23, 1906	....do	....do	Below Harlem Canal	..	46
May 5, 1906	....do	....do	....do	..	60
May 23, 1906	....do	....do	....do	..	30
July 14, 1905	....do	....do	Harlem	a	4.0
July 28, 1905	....do	....do	....do	..	409
Aug. 4, 1905	....do	....do	....do	a	50
Aug. 17, 1905	....do	....do	....do	a	5.0
Aug. 25, 1905	....do	....do	....do	a	1.0
Sept. 5, 1905	....do	....do	....do	a	2.0
Aug. 8, 1904	....do	....do	Fort Belknap Agency	..	1.4
Jan. 16, 1910	....do	....do	Exeter	a	25
Aug. 6, 1904	....do	....do	Glasgow	..	27.5
July 19, 1906	....do	....do	....do	..	430
June 21, 1900	Middle Fork Milk	Milk River	Nine miles above Junction	..	7
June 19, 1900	North Fork Milk	....do	Near Hall's ranch	..	12
Aug. 7, 1901	....do	....do	McLeod trail ford	..	27
July 31, 1906	Beaver Creek	....do	Fort Assiniboine	..	6.8
July 31, 1906	....do	....do	Pacific Junction	..	5.6
July 3, 1906	Clear Creek	....do	Yantic	..	67
June 29, 1906	Threemile Coulee	....do	Chinook	..	4.7
July 20, 1906	W. Fork Milk	....do	At ford one mile below West Fork ditch	..	10
June 29, 1906	Sixmile Coulee	....do	One-half mile above mouth	..	4.8
June 29, 1906	Fifteenmile Coulee	....do	Zurich	..	8.8
July 6, 1906	Snake Creek	....do	Harlem	..	5.8
July 27, 1906	Peoples Creek	....do	Fort Belknap Indian Reservation	..	6.0
April 8, 1904	Exeter Creek	....do	Exeter	..	20
April 13, 1904	....do	....do	....do	a	1.0
April 18, 1904	Alkali Creek	....do	Near Malta	..	275
July 27, 1906	....do	....do	....do	..	1.0
July 25, 1906	Cottonwod Creek	....do	18 miles N. E. of Malta	..	5.0
July 25, 1906	Whitewater Creek	....do	Upper reservoir	..	4.0
July 24, 1906	White Creek	....do	Mills' ranch	..	0.25
July 24, 1906	Frenchman Creek	....do	Saco (5 miles above mouth)	..	50
Sept. 12, 1903	Beaver Creek	....do	Ten miles above Ashfield	a	0.5
July 12, 1906	....do	....do	Ten miles S. of Lake Bowdoin	..	20
July 16, 1906	Larb Creek	Beaver Creek	Near Malta	..	2.0

Water Supply paper No. 208 gives estimated flood discharge of streams in the Milk River drainage basin for June, 1906.

*The measurements of the Giant Springs at Great Falls should be considered as approximate and underestimated, because in addition to there being an irregular and broken section for measuring the visible flow, it is said that there are parts of the springs which enter the river below the water surface and which may be seen bubbling up at low water and which cannot be measured.

a—Estimated.

GENERAL FEATURES OF THE YELLOWSTONE RIVER DRAINAGE BASIN.

The Yellowstone River rises in northwestern Wyoming and flows northward into Yellowstone Lake, which is 7,778 feet above sea level, and nearly surrounded by the high mountains of the Yellowstone National Park. Leaving the lake, it flows North about 35 miles, crossing into Montana and continues northward to Livingston. From Livingston its general direction is northeasterly until it flows into the Missouri just across the Montana state line near Mondak. The length of its course in Montana is a little over 400 miles.

The headwaters of the Yellowstone River and many of its tributaries drain mountainous and precipitous forested regions. After leaving Livingston the course of the main stream lies in a more open section, while the lower portion of the basin is in the plains region.

Among the important tributaries of the Yellowstone are the Shields, Boulder, Stillwater, Clarke Fork, Bighorn, Tongue and Powder Rivers. These streams all rise in mountainous regions, and waters diverted from them and other tributaries irrigate numerous tracts of valley and bench land.

The mean annual rainfall in the lower section of the basin is from 13 to 15 inches, while records at several stations in the mountains give about 24 inches. This is probably much less than falls in the more remote inaccessible places where snow lies from November to June.

There are numbers of possible power sites and reservoir sites on the Yellowstone and its tributaries, and there are several large irrigation projects completed, and others are in the course of construction.

YELLOWSTONE RIVER.

Observation Station Located at Horr, Mont.

Established in 1889.
Elevation of Station, about 5,100 feet.
Elevation of Head Waters, 10,000 feet.
Rainfall observed at Yellowstone Park, Wyo.
Drainage Area, 2,700 square miles.
Character of Drainage Basin: Steep mountains well timbered.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1889:						
August, 12 to 31	1,853	1,411	1,660	0.62	102,000	0.71
September	1,653	1,126	1,270	.47	75,600	.52
October	1,126	841	976	.36	60,000	.42
November	841	651	743	.27	44,200	.31
December	...	...	a650	.24	40,000	.28
Monthly Flow for the Year of 1890:						
January	...	...	a550	.20	33,800	.23
February	...	...	a550	.20	30,500	.21
March, 23-31	620	560	585	.22	36,000	.25
April	4,495	510	1,417	.53	84,200	.59
May	11,915	5,090	7,522	2.79	466,000	3.21

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
June	11,915	8,720	10,086	3.74	603,000	4.17
July	9,410	5,760	7,682	2.84	473,000	3.28
August	5,600	3,145	4,375	1.62	269,000	1.87
September	3,145	1,670	2,276	.84	135,000	.94
October	1,920	1,160	1,473	.55	90,600	.63
November	1,160	850	970	.36	57,700	.40
December	815	590	695	.26	42,700	.30
Total Recorded	11,915	510	3,181	1.18	2,320,000	16.08
Monthly Flow for the Year of 1891:						
January	590	470	488	.18	30,000	.21
February, 1-14	...	...	a500	.18	27,800	.19
March	360	285	316	.12	19,400	.13
April	2,720	360	1,082	.40	64,400	.45
May	7,480	1,855	5,227	1.93	322,000	2.24
June	8,975	6,685	7,592	2.81	452,000	3.13
July	7,110	5,090	6,135	2.27	377,000	2.62
August	4,920	2,060	3,442	1.28	212,000	1.47
September	2,625	1,250	1,641	.61	97,600	.68
October	1,610	1,080	1,264	.47	77,700	.54
November	1,080	680	891	.33	53,000	.37
December	745	360	475	.18	29,200	.21
Total Recorded	8,975	285	2,421	.90	1,760,000	12.24
Monthly Flow for the Year of 1892:						
January	...	...	a500	.19	30,800	.21
February	650	470	570	.21	32,800	.23
March	780	620	713	.26	43,800	.30
April	780	590	664	.25	39,500	.27
May	10,200	710	3,544	1.31	218,000	1.51
June	15,200	6,520	11,201	4.15	666,000	4.63
July	15,500	6,770	10,180	3.78	626,000	4.35
August	6,770	3,400	4,931	1.82	303,000	2.10
September	3,485	1,920	2,808	1.04	167,000	1.16
October	1,920	1,200	1,555	.58	95,600	.66
November	1,200	745	952	.35	56,600	.39
December	.....	.....	a800	.30	49,200	.34
Total Recorded	15,500	470	3,202	1.19	2,330,000	16.15
Monthly Flow for the Year of 1893:						
January	.....	.....	a800	.30	49,200	.34
February	.....	.....	a700	.26	38,800	.27
March	.....	.....	a700	.26	43,000	.30
April, 16-30	745	590	665	.25	39,600	.27
May	8,630	650	3,282	1.22	202,000	1.42
June	13,610	5,090	9,602	3.58	571,000	3.98
July	9,590	5,430	7,399	2.74	455,000	3.16
August	5,345	2,455	3,780	1.40	232,000	1.62
September	2,540	1,855	2,098	.78	125,000	.87
October	2,060	1,440	1,630	.60	100,000	.71
Total Recorded	.....	.....	.....	....	1,860,000	
Mean Monthly Flow for the Period of Record:						
January	.....	.....	584	.216	35,900	.25
February	.....	.....	591	.219	32,800	.23
March	.....	285	577	.214	35,500	.25
April	4,500	360	999	.370	59,400	.41
May	11,900	650	4,890	1.81	301,000	2.09
June	15,200	5,090	9,620	3.56	572,000	3.97
July	15,500	5,090	7,850	2.90	483,000	3.34
August	6,770	1,410	3,780	1.40	232,000	1.61
September	3,480	1,130	2,020	.748	120,000	.83
October	2,060	841	1,380	511	84,800	.59
November	1,200	651	889	.329	52,900	.37
December	.....	.....	655	.242	40,300	.28
Mean Yearly	15,500	285	2,820	1.04	2,050,000	14.22

YELLOWSTONE RIVER—Continued.

Reference for daily flow in U. S. G. S. Annual Reports Nos. 11 part 2, 12 part 2, 13 part 3, 14 part 2, and Bulletin 131.

Rainfall at Yellowston Park Station: Maximum, 28.43 inches in 1890. Minimum, 8.85 inches in 1903. Mean, 18.8 inches for 23 years, 1887 to 1909 inclusive.

Note—The mean rainfall for the above period of stream flow record is about 21.3 inches. which gives a run-off at Horr of about 67 per cent of the precipitation at Yellowstone Park Station. The surrounding mountains probably have a much greater precipitation than Yellowstone Park Station.

YELLOWSTONE RIVER

Observation Station Located in N. E. ¼ Sec. 30, T. 8 N., R. 8 E., at Corwin Springs, Mont.

Established in 1910.
Elevation of Station, about 5,000 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 2,880 square miles.
Character of Drainage Basin: Steep mountains, well timbered.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
September	1,620	1,300	1,440	85,700
October	1,370	1,160	1,270	78,100
November	1,160	1,040	1,110	66,100
December	1,100	.....	995	61,200
Monthly Flow for the Year of 1911:				
January	.....	.....	900	55,300
February	.....	.....	900	50,000
March	1,300	950	1,050	64,600
April	1,800	1,160	1,400	83,300
May	8,230	1,710	4,370	269,000
June	22,800	11,100	16,900	1,010,000
July	14,800	5,740	9,280	571,000
August	5,520	2,530	3,790	233,000
September	2,530	1,800	2,160	129,000
October	1,990	1,370	1,650	101,000
November	1,450	1,160	1,330	79,100
December	1,450	1,100	1,200	73,800
Total Recorded	22,800	.....	3,740	2,720,000

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 286 and 306.

YELLOWSTONE RIVER.

Observation Station Located in T. 2 S., R. 9 E., at Livingston, Mont.

Established in 1897.
Elevation of Station, about 4,480 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 3,580 square miles.
Character of Drainage Basin: Steep mountains, well timbered.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1897:						
May	23,100	3,200	13,402	3.74	824,000	4.31
June	26,820	10,080	15,257	4.26	908,000	4.75
July	11,940	5,100	7.231	2.02	445,000	2.33
August	4,990	3,100	4,099	1.15	252,000	1.33
September	3,100	1,950	2,450	.68	146,000	.75
October	2,210	1,650	1,915	.53	118,000	.61
November—a	.....	.....	1,600	.45	95,200	.50
December—a	.....	.....	1,300	.36	79,900	.41

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1898:						
January—a	.....	.....	1,500	.42	92,200	.48
February—a	.....	.....	1,800	.50	100,000	.52
March (1-21)—a	.....	.....	1,900	.53	117,000	.61
April	5,039	1,973	2,895	.81	172,600	.90
May	15,622	3,506	7,560	2.11	465,000	2.44
June	23,239	8,696	14,976	4.18	891,000	4.66
July	12,621	5,039	8,560	2.39	526,000	2.76
August	5,039	3,579	4,356	1.21	268,000	1.39
September	3,944	2,630	3,134	.88	186,000	.98
October	2,776	2,192	2,456	.69	151,000	.79
November	2,192	1,754	1,985	.55	118,000	.61
December—a	.....	.....	1,600	.45	98,400	.52
Total Recorded	23,239	.....	4,394	1.23	3,180,000	16.66
Monthly Flow for the Year of 1899:						
January—a	.....	.....	3,096	.86	190,000	.99
February—a	.....	.....	3,107	.87	173,000	.91
March	3,652	3,130	3,302	.92	203,000	1.06
April	5,275	3,270	4,016	1,12	239,000	1.25
May	13,225	4,075	7,688	2.15	473,000	2.48
June, 7 days	.....	.....	14,174	3.96	197,000	1.03
July, 23 to 31	.....	.....	13,856	3.87	247,000	1.29
August	12,005	4,730	7,904	2.21	486,000	2.55
September	4,630	2,855	3,621	1.01	215,000	1.13
October	2,790	2,260	2,541	.71	156,000	.82
November—a	.....	.....	2,083	.58	124,000	.65
December—a	.....	.....	1,590	.44	97,800	.51
Total Recorded	.....	.....	.....	....	2,800,000	....
Monthly Flow for the Year of 1900:						
January—a	.....	.....	1,400	.39	86,100	.45
February—a	.....	.....	1,400	.39	77,800	.41
March—a	.....	.....	1,300	.36	79,900	.42
April	2,922	1,340	1,894	.53	113,000	.59
May	14,805	2,490	7,530	2.10	463,000	2.43
June	15,362	7,995	11,415	3.19	679,000	3.56
July	7,270	3,420	4,811	1.34	296,000	1.54
August	3,345	2,150	2,666	.74	164,000	.85
September	2,100	1,715	1,878	.52	112,000	.58
October	1,760	1,500	1,607	.45	98,800	.52
November	1,500	1,190	1,391	.39	82,800	.44
December	2,050	1,030	1,513	.42	93,000	.48
Total Recorded	.....	.....	3,241	.90	2,350,000	12.29
Monthly Flow for the Year of 1901:						
January—a	.....	.....	1,100	.31	67,600	.36
February—a	.....	.....	1,000	.28	55,500	.29
March	1,380	1,000	1,264	.35	77,700	.40
April	2,050	1,265	1,489	.42	88,600	.47
May	26,525	2,665	12,200	3.40	750,000	3.92
June	13,250	8,230	10,228	2.86	609,000	3.19
July	8,075	3,590	5,534	1.55	340,000	1.79
August	4,400	2,440	3,107	.87	191,000	1.00
September	2,560	2,050	2,248	.63	134,000	.70
October	2,050	1,750	1,926	.54	118,000	.62
November—a	.....	.....	1,593	.45	94,800	.50
December—a	.....	.....	1,200	.34	73,800	.39
Total Recorded	.....	.....	3,570	1.00	2,600,000	13.63
Monthly Flow for the Year of 1902:						
January	1,550	1,000	1,242	.35	76,400	.40
February	1,550	1,000	1,254	.35	69,600	.36
March	1,317	1,170	1,268	.35	78,000	.40
April	2,137	1,280	1,479	.41	88,000	.46
May	13,350	1,640	6,392	1.79	393,000	2.06
June	14,650	9,650	11,230	3.14	668,000	3.50
July	10,050	5,790	7,899	2.21	486,000	2.55
August	5,590	2,680	3,974	1.11	244,000	1.28
September	2,592	1,770	2,053	.57	122,000	.64
October	1,770	1,397	1,564	.44	96,200	.51

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
November	1,440	1,135	1,309	.37	77,900	.41
December	1,355	960	1,129	.32	69,400	.37
Total Recorded	14,650	960	3,402	.95	2,470,000	12.94
Monthly Flow for the Year of 1903:						
January	1,280	960	1,152	.322	70,800	.37
February—b	1,200	880	1,087	.304	60,400	.32
March	1,320	1,060	1,185	.331	72,900	.38
April	2,150	1,200	1,436	.401	85,400	.45
May	7,480	1,585	3,236	.904	199,000	1.04
June	20,400	10,770	15,711	4.390	935,000	4.90
July	13,120	5,400	8,481	2.370	522,000	2.73
August	5,540	2,830	3,852	1.080	237,000	1.25
September	2,800	2,290	2,521	.704	150,000	.78
October	2,500	1,830	2,155	.602	133,000	.69
November—c	1,890	1,450	1,673	.467	99,600	.52
December	1,950	1,200	1,462	.408	89,900	.47
Total Recorded	20,400	880	3,662	1.024	2,650,000	13.90
Monthly Flow for the Year of 1904:						
January	1,385	1,045	1,211	.338	74,500	.39
February	1,430	1,045	1,256	.351	72,200	.38
March	1,745	1,250	1,460	.408	89,800	.47
April	3,615	1,475	2,102	.587	125,000	.66
May	19,930	3,280	8,446	2,359	519,000	2.72
June	19,930	13,590	17,291	4.830	1,030,000	5.39
July	16,405	6,820	11,069	3.092	681,000	3.56
August	6,695	3,445	4,604	1.286	283,000	1.48
September	3,615	2,380	2,749	.768	164,000	.86
October	2,220	1,880	2,030	.567	125,000	.65
November	1,880	1,520	1,653	.462	98,400	.52
December	1,880	900	1,388	.388	85,300	.45
Total Recorded	19,930	900	4,605	1.286	3,350,000	17.53
Monthly Flow for the Year of 1905:						
January	1,200	630	1,054	.294	64,800	.34
February, 15 days	1,250	700	1,032	.288	30,700	.16
March	1,250	1,020	1,139	.318	70,000	.37
April	2,215	1,110	1,396	.390	83,100	.44
May	5,980	1,580	2,752	.769	169,000	.89
June	13,820	8,130	10,670	2.98	635,000	3.32
July	9,540	3,970	6,180	1.73	380,000	1.99
August	3,970	2,410	3,068	.857	189,000	.99
September	2,410	1,700	1,975	.552	118,000	.62
October	1,890	1,300	1,572	.439	96,700	.51
November	1,300	930	1,190	.332	70,800	.37
December	1,250	700	1,025	.286	63,000	.33
Total Recorded	.....	.....	.....	....	1,970,000	...
Mean Monthly Flow for the Years of 1897–1905.						
January	.....	630	1,470	.411	90,400	.47
February	.....	700	1,520	.425	84,400	.44
March	3,650	1,000	1,600	.447	98,400	.52
April	5,280	1,110	2,090	.584	124,000	.65
May	26,500	1,580	7,690	2.15	473,000	2.48
June	26,800	8,000	13,400	3.74	797,000	4.17
July	16,400	3,420	7,730	2.16	475,000	2.49
August	12,000	2,150	4,180	1.17	257,000	1.35
September	4,630	1,700	2,510	.702	149,000	.78
October	2,790	1,300	1,970	.550	121,000	.63
November	2,190	930	1,610	.450	95,800	.50
December	2,050	700	1,360	.380	83,600	.44
Mean Yearly	26,800	630	3,930	1.10	2,850,000	14.92

a—Approximate.
b—Estimated February 14–18, 1903.
c—Estimated November 15–25 and 29, 1903.

Reference for daily flow in U. S. G. S. Annual Reports Nos. 19 part 4, 20 part 4, and 22 part 4; and in Water Supply Papers Nos. 15, 27, 37, 49, 52, 66, 75, 84, 99, 130 and 172.

Note—The mean rainfall at Yellowstone Park Station for the above period of stream flow record is about 16.6 inches, which gives a run-off at Livingston of about 88 per cent of the precipitation at Yellowstone Park Station.

YELLOWSTONE RIVER.

Observation Station Located in T. 1 N., R.26 E., Two Miles East of Billings, Mont.
Established in 1904.
Elevation of Station, about 3,100 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 11,180 square miles.
Character of Drainage Basin: Varies from mountains to semi-arid benches.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
June	32,580	19,840	25,972	2.323	1,540,000	2.59
July	25,475	11,995	18,088	1.618	1,110,000	1.86
August	12,265	6,325	8,257	.738	508,000	.85
September	8,410	4,145	5,240	.469	312,000	.52
October	4,590	3,720	3,973	.355	244,000	.41
November	3,720	3,225	3,420	.306	204,000	.34
December	3,225	2,740	2,906	.260	179,000	.30
Total Recorded	.....	.....	.....	....	4,100,000	...
Monthly Flow for the Year of 1905:						
March, 12–31	3,060	1,800	2,612	.234	104,000	.17
April	4,425	1,535	2,747	.246	164,000	.27
May	12,150	3,425	5,943	.532	365,000	.61
June	31,860	14,590	24,700	2.21	1,470,000	2.47
July	25,190	8,285	14,740	1.32	906,000	1.52
August	8,790	4,640	6,218	.556	382,000	.64
September	4,640	3,425	3,933	.352	234,000	.39
October	4,010	3,425	3,615	.323	222,000	.37
November, 1–28	3,425	3,060	3,290	.294	183,000	.31
Total Recorded	.....	.....	.....	....	4,030,000	...

Note—A measurement of the Yellowstone River at Billings September 16, 1909, gave a discharge of 7,790 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 130, 172 and 266.

YELLOWSTONE RIVER

Observation Station Located in S. W. ¼ Sec. 24, T. 2 N., R. 27 E., at Huntley, Mont.
Established in 1907.
Elevation of Station, about 3,000 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 12,000 square miles.
Character of Drainage Basin: Varies from mountains to semi-arid bench lands.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1907:						
October	6,420	4,000	4,930	0.411	303,000	0.47
November	4,000	3,080	3,510	.292	209,000	.33
December	3,080	1,060	2,110	.176	130,000	.20
Monthly Flow for the Year of 1908:						
January	3,380	1,860	2,790	.232	172,000	.27
February	.....	.....	1,870	.156	108,000	.17
March	.....	.....	1,880	.157	116,000	.18
April	8,990	2,030	4,470	.372	266,000	.42
May	33,800	4,320	12,700	1.06	781,000	1.22

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
June	41,200	22,100	31,500	2.62	1,870,000	2.92
July	32,400	14,200	23,400	1.95	1,440,000	2.25
August	12,200	6,610	9,070	.756	559,000	.87
September	6,800	4,640	5,450	.454	324,000	.51
October	6,040	2,800	5,420	.452	333,000	.52
November	4,640	2,800	4,140	.345	246,000	.38
December	4,320	1,700	2,940	.245	181,000	.28
Total Recorded	41,200	.....	8,800	.733	6,400,000	9.99
Monthly Flow for the Year of 1909:						
March, 9-31	7,520	3,000	4,840	.403	221,000	.34
April	3,350	3,000	3,060	.255	182,000	.28
May	23,000	3,230	8,680	.724	534,000	.84
June	42,200	21,200	32,300	2.69	1,920,000	3.00
July	40,100	12,800	23,400	1.95	1,440,000	2.25
August	13,400	5,800	9,290	.774	571,000	.89
September	10,000	5,800	7,360	.613	438,000	.68
October	6,050	4,880	5,620	.468	346,000	.54
November	5,160	4,600	4,770	.398	284,000	.44
Total Recorded	.....	.....	.....	.....	5,940,000	.....
Monthly Flow for the Year of 1910:						
January	.....	.....	a3,000	.250	184,000	.29
February	.....	.....	a2,900	.242	161,000	.25
March	.....	.....	a8,330	.693	512,000	.80
April	19,600	4,730	7,640	.637	455,000	.71
May	26,600	15,000	19,100	1.59	1,170,000	1.83
June	31,600	14,000	19,700	1.64	1,170,000	1.83
July	14,000	5,640	9,290	.774	571,000	.89
August	5,520	3,080	3,980	.332	245,000	.38
September	5,460	2,920	3,550	.296	211,000	.33
October	4,050	3,400	3,870	.322	238,000	.37
November	3,300	2,760	3,160	.263	188,000	.29
December	3,460	2,540	2,920	.243	180,000	.28
Total Recorded	31,600	2,540	7,280	.607	5,280,000	8.25
Monthly Flow for the Year of 1911:						
January	.....	.....	b2,000	.167	123,000	.19
February	.....	.....	b2,200	.183	122,000	.19
March	8,700	2,500	5,320	.443	327,000	.51
April	6,400	4,050	4,870	.406	290,000	.45
May	20,400	5,200	10,700	.892	658,000	1.03
June	47,900	18,300	36,500	3.04	2,170,000	3.39
July	24,200	11,000	17,000	1.42	1,050,000	1.64
August	11,000	4,900	7,830	.652	481,000	.75
September	4,900	4,320	4,560	.380	271,000	.42
October	4,600	3,500	3,950	.329	243,000	.38
November	3,780	.....	b3,140	.262	187,000	.29
December	.....	.....	b2,300	.192	141,000	.22
Total Recorded	.....	.....	8,370	.698	6,060,000	9.46
Mean Monthly Flow for the Period of Record:						
January	.....	.....	2,570	.214	158,000	.25
February	.....	.....	2,320	.193	129,000	.20
March	.....	.....	5,110	.426	314,000	.49
April	19,600	2,030	5,010	.417	298,000	.47
May	33,800	3,230	12,800	1.07	787,000	1.23
June	47,900	14,000	30,000	2.50	1,790,000	2.79
July	40,100	5,640	18,300	1.52	1,130,000	1.75
August	13,400	3,080	7,540	.628	464,000	.72
September	10,000	2,920	5,230	.436	311,000	.49
October	6,420	2,800	4,760	.397	293,000	.46
November	5,160	2,800	3,740	.312	223,000	.35
December	.....	1,060	2,570	.214	158,000	.25
Mean Yearly	47,900	1,060	8,330	.694	6,060,000	9.45

a—Estimated Jan. 1 to Mar. 10, 1910. b—Estimated Jan., Feb., and Nov. 7 to Dec. 31, 1911.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.

YELLOWSTONE RIVER.

Observation Station Located in T. 5 N., R. 34 E., at Junction, Mont.
Established in 1906.
Elevation of Station, about 2,700 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 13,500 square miles.
Character of Drainage Basin: Varies from mountains to semi-arid benchlands.

Month.	Discharge in Second-feet				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches Drainage Area
Monthly Flow for the Year of 1906:						
May, 10–31	23,800	5,010	16,400	1.21	716,000	0.99
June	45,200	14,000	20,100	1.49	1,200,000	1.66
July	19,600	8,250	14,600	1.08	898,000	1.24
August	11,300	5,510	7,060	.523	434,000	.60
September	5,510	3,640	4,520	.335	269,000	.37
October	3,640	2,900	3,140	.233	193,000	.27
November	3,250	2,100	2,770	.205	165,000	.23
December	3,250	1,950	2,810	.208	173,000	.24
Total Recorded	.....	.....	.....	.....	4,050,000	.....
Monthly Flow for the Year of 1907:						
January	.....	.....	a1,500	.111	92,200	.13
March, 19–31	3,390	2,900	3,140	.233	81,000	.11
April	4,820	3,060	4,000	.296	238,000	.33
May	20,600	3,060	9,800	.726	603,000	.84
June	40,500	15,600	27,800	2.06	1,650,000	2.30
July	48,400	22,800	34,400	2.56	2,120,000	2.95
August	23,100	7,900	13,200	.978	812,000	1.13
September	8,890	4,820	6,630	.490	395,000	.55
October	6,500	4,080	4,930	.365	303,000	.42
November	4,080	3,390	3,650	.270	217,000	.30
December	3,390	2,740	3,040	.225	187,000	.26
Total Recorded	.....	.....	.....	.....	6,700,000	.....

a—Estimated. ....
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 208 and 246.

YELLOWSTONE RIVER.

Observation Station Located in T. 16 N., R. 55 E., at Glendive, Mont.
Established in 1893—(See note).
Elevation of Station, about 2,070 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 66,100 square miles.
Character of Drainage Basin: Varies from high mountains to semi-arid plains.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1903:						
January	.....	.....	a 5,000	0.076	307,000	0.088
February	.....	.....	a 7,000	.106	389,000	.110
March, 16–31	20,610	15,480	a10,000	.151	615,000	.174
April	39,150	4,600	6,208	.094	369,000	.105
May	22,550	4,700	10,775	.163	664,000	.188
June	62,300	10,550	40,594	.614	2,420,000	.685
July	61,000	16,550	28,089	.425	1,730,000	.490
August	30,200	7,780	14,012	.212	862,000	.244
September	10,150	6,075	7,737	.117	460,000	.130
October	7,510	5,900	6,860	.104	422,000	.120

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
November, 1–15	5,900	5,750	a 5,750	.087	340,000	.097
December	.....	.....	a 5,700	.086	350,000	.099
Total Recorded	.....	.....	12,310	.186	8,930,000	2.53
Monthly Flow for the Year of 1904:						
January	.....	.....	a 5,700	.086	350,000	.099
February	.....	.....	a 5,700	.086	328,000	.093
March	.....	.....	a 5,700	.086	350,000	.099
April	48,000	7,780	13,936	.211	829,000	.235
May	66,200	12,190	27,002	.409	1,660,000	.472
June	77,900	39,150	54,882	.830	3,270,000	.926
July	51,900	21,890	33,500	.507	2,060,000	.584
August	21,240	9,020	12,698	.196	797,000	.226
September	14,705	5,985	8,273	.125	492,000	.139
October, 1–23	7,510	5,750	a 6,000	.091	369,000	.105
December, 1–5	.....	.....	7,000	.106	69,400	.020
Total Recorded	.....	.....	.....	.....	10,600,000	3.00
Monthly Flow for the Year of 1905:						
March, 20–31	5,100	4,310	4,670	.071	111,000	.032
April	5,100	3,750	4,374	.066	260,000	.074
May	17,450	5,100	9,663	.146	594,000	.168
June	67,800	18,000	47,970	.726	2,850,000	.810
July	53,300	16,350	29,240	.442	1,800,000	.510
August	23,200	6,740	11,110	.168	683,000	.194
September	7,020	4,310	5,751	.087	342,000	.097
October	8,160	5,200	5,917	.090	364,000	.104
November	5,760	5,100	5,294	.080	315,000	.089
Total Recorded	.....	.....	.....	.....	7,320,000	2.08
Monthly Flow for the Year of 1906:						
April	18,800	7,160	10,700	.162	637,000	.18
May	55,400	8,480	25,100	.380	1,540,000	.44
June	79,400	22,900	41,500	.628	2,470,000	.70
July	32,400	16,000	26,300	.398	1,620,000	.46
August	27,900	8,820	15,400	.233	947,000	.27
September	13,900	6,490	8,820	.133	525,000	.15
October	6,360	5,420	5,610	.085	345,000	.10
November	.....	.....	5,570	.084	331,000	.09
Total Recorded	.....	.....	.....	.....	8,420,000	2.39
Monthly Flow for the Year of 1907:						
March, 24–31	13,400	7,160	9,680	.146	154,000	.04
April	8,480	5,530	6,940	.105	413,000	.12
May	65,400	6,490	20,600	.312	1,270,000	.36
June	90,600	27,500	53,200	.805	3,170,000	.90
July	87,800	40,800	64,000	.968	3,940,000	1.12
August	43,100	13,400	24,100	.365	1,480,000	.42
September	15,100	8,480	11,600	.175	690,000	.20
October	10,300	7,020	8,220	.124	505,000	.14
November	7,020	5,530	6,100	.092	363,000	.10
December, 1–12	5,760	4,860	5,380	.081	128,000	.04
Total Recorded	.....	.....	.....	.....	12,100,000	3.44
Monthly Flow for the Year of 1908:						
April, 8–30	15,400	4,640	8,440	.128	385,000	.11
May	49,700	7,860	21,300	.322	1,310,000	.37
June	86,400	39,800	60,800	.920	3,620,000	1.03
July	68,200	23,200	44,800	.678	2,750,000	.78
August	22,900	12,200	16,400	.248	1,010,000	.29
September	11,800	7,440	8,620	.130	513,000	.14
October	11,800	7,860	9,500	.144	584,000	.17
November, 1–10	8,160	7,300	7,710	.117	153,000	.04
Total Recorded	.....	.....	.....	.....	10,300,000	2.93
Monthly Flow for the Year of 1909:						
April	6,740	5,080	5,630	.085	335,000	.09
May	46,700	5,990	14,000	.212	861,000	.24
June	107,000	40,300	74,200	1.12	4,420,000	1.25
July	96,500	24,700	50,020	.759	3,090,000	.88
August	27,100	9,920	16,700	.253	1,030,000	.29

YELLOWSTONE RIVER—Continued.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	18,000	9,000	12,100	.183	720,000	.20
October	8,820	6,740	7,650	.116	470,000	.13
November, 1–15	6,490	5,880	6,220	.094	185,000	.05
Total Recorded	.....	.....	.....	.....	11,100,000	3.13
Monthly Flow for the Year of 1910:						
January	.....	.....	a 5,500	.083	338,000	.01
February	.....	.....	a 5,000	.076	278,000	.08
March	.....	.....	b18,800	.284	1,160,000	.33
April	22,100	6,740	9,960	.151	593,000	.17
May	39,100	18,800	28,600	.433	1,760,000	.50
June	47,600	23,100	32,200	.487	1,920,000	.54
July	23,100	10,900	15,500	.234	953,000	.27
August	10,900	5,990	8,090	.122	497,000	.14
September	15,900	5,330	7,260	.110	432,000	.12
October	9,120	5,330	5,820	.088	358,000	.10
November	5,540	5,330	5,510	.083	328,000	.09
December	.....	.....	a 4,500	.068	277,000	.08
Total Recorded	.....	.....	12,300	.186	8,890,000	2.52
Monthly Flow for the Year of 1911:						
January	.....	.....	c 3,500	.053	215,000	.06
February	.....	.....	c 4,000	.060	222,000	.06
March	13,600	6,740	c 9,270	.140	570,000	.16
April	6,740	5,080	5,900	.089	351,000	.10
May	27,500	6,740	12,800	.194	787,000	.22
June	78,400	29,600	55,800	.844	3,320,000	.94
July	42,200	18,600	27,500	.416	1,690,000	.48
August	24,400	9,850	15,500	.235	953,000	.27
September	24,400	6,740	9,900	.150	589,000	.17
October	7,800	6,000	6,680	.101	411,000	.12
November	5,760	.....	c 4,750	.072	283,000	.08
December	.....	.....	c 4,000	.060	246,000	.07
Total Recorded	78,400	.....	13,300	.202	9,640,000	2.73
Mean Monthly Flow for the Period of Record:						
January	.....	.....	4,920	.074	303,000	.09
February	.....	.....	5,420	.082	301,000	.09
March	20,600	4,310	10,400	.157	640,000	.18
April	48,000	3,750	8,000	.121	476,000	.14
May	66,200	4,700	18,900	.286	1,160,000	.33
June	107,000	10,600	51,200	.775	3,050,000	.86
July	96,500	10,900	35,400	.536	2,180,000	.62
August	43,100	5,990	14,900	.225	916,000	.26
September	24,400	4,310	8,900	.136	530,000	.15
October	11,800	5,200	6,920	.105	425,000	.12
November	8,160	.....	5,660	.086	337,000	.10
December	.....	.....	4,900	.074	301,000	.09
Mean Yearly	107,000	3,750	14,600	.222	10,600,000	3.03

Note—This station was established in 1893 by the U. S. War Department. It was later transferred to the Department of Agriculture which kept daily gage height records. In 1903 the U. S. Geological Survey began keeping records of the stream-flow. Daily gage heights for the years 1897 to 1902 are published in Water Supply paper 99, but no discharge measurements were made in those years.

a—Discharge estimated for month.

b—Discharge estimated Mar. 1–7, 1910.

c—Estimated Jan. 1 to Mar. 7, and Nov. 8 to Dec. 31, 1911.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 99, 130, 172, 208, 246, 266, 286 and 306.

NORTH FORK OF BIG TIMBER CREEK.

Observation Station Located in S. E. ¼ Sec. 26 T. 3 N., R. 13 E., 15 Miles Northwest of Big Timber, Mont.

Established in 1907.
Elevation of Station 4,800 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 40 square miles.
Character of Drainage Basin: Steep and rocky mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
May, 7-31	387	48	121	6,000
June	409	97	236	14,000
July	380	135	240	14,800
August	168	34	74.9	4,610
September	34	19	25.2	1,500
October	34	18	20.0	1,230
November, 1-9	18	18	18.0	321
Total Recorded	.....	.....	.....	42,500
Monthly Flow for the Year of 1908:				
March, 22-31	15	11	12.4	246
April	48	12	23.3	1,390
May	278	30	71.5	4,400
June	897	58	383	22,800
July	262	66	132	8,120
August	82	19	54.7	3,360
September	27	24	24.3	1,450
October, 1-24	34	22	27.1	1,290
Total Recorded	.....	.....	.....	43,100
Monthly Flow for the Year of 1909:				
March	12	9.0	10.6	652
April	27	13.5	19.2	1,140
May	332	17.0	96.7	5,950
June	498	90	250	14,900
July	172	52	85.5	5,260
August	73	37	45.4	2,790
September	230	34	67.6	4,020
October	82	17	32.5	2,000
November	24	13.5	17.4	1,040
Total Recorded	.....	.....	.....	37,800
Monthly Flow for the Year of 1910:				
March	32	15	a20.8	1,280
April	140	20	53.9	3,210
May	158	30	a75.1	4,620
June	37	7.8	a25.7	1,530
July	24	7.8	13.7	842
August	30	7.2	16.4	1,010
September	34	5.0	a20.3	1,210
Total Recorded	.....	.....	.....	13,700
Monthly Flow for the Year of 1911:				
January	.....	.....	b10	615
February	.....	.....	b10	555
March	18	10	b15.0	922
April	25	15	19.4	1,150
May	370	17	96.3	5,920
June	490	59	255	15,200
July	61	22	45.8	2,820
August	65	22	37.3	2,290
September	28	17	21.8	1,300
October	17	13	b14.0	861
November	.....	.....	b12	714
December	.....	.....	b 9	553
Total Recorded	490	.....	45.4	32,900
Mean Monthly Flow for the Period of Record:				
January	.....	.....	10.0	615
February	.....	.....	10.0	555
March	32	9	15.2	935
April	140	12	29.0	1,730
May	387	17	91.1	5,600
June	897	7.8	230	13,700
July	380	7.8	103	6,330

NORTH FORK OF BIG TIMBER CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
August	168	7.2	45.7	2,810
September	230	5.0	31.8	1,890
October	82	13	23.2	1,430
November	.....	.....	15.1	898
December	.....	.....	9.0	553
Mean Yearly	897	5.0	51.1	37,000

a—Estimated Mar. 1 to 7, May 12 to June 7, and Sept. 26 to 30, 1910.
b—Estimated Jan. 1 to Mar. 5, and Oct. 27 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 246, 266, 286 and 306.

SOUTH FORK OF BIG TIMBER CREEK.

Observation Station Located in S. E. ¼ Sec. 26, T. 3 N., R. 13 E., 15 Miles Northwest of Big Timber, Mont.

Established in 1907.
Elevation of Station, 4,800 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 28 square miles.
Character of Drainage Basin: Steep and rocky mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
May, 7-31	125	6.0	53.6	2,660
June	287	41	147	8,750
July	340	106	185	11,400
August	187	17	60.5	3,720
September	21	2.0	9.6	571
October	21	6.0	9.1	560
November, 1-9	6.0	6.0	6.0	107
Total Recorded	...	...	...	27,800
Monthly Flow for the Year of 1908:				
March, 22-31	4.0	2.0	2.6	52
April	33	4.0	12.1	720
May	119	3.0	29.0	1,780
June	550	28	332	19,800
July	294	33	144	8,850
August	33	3.0	17.5	1,080
September	15	8.0	11.1	660
October, 1-24	15	10	12.6	600
Total Recorded	..	..	..	33,500
Monthly Flow for the Year of 1909:				
March	6.0	3.0	3.82	235
April	23	6.0	10.5	625
May	260	6.0	63.4	3,900
June	395	58	160	9,520
July	149	28	47.1	2,900
August	28	8.0	15.9	978
September	119	12	33.1	1,970
October	28	10	13.9	855
November	19	10	12.5	744
Total Recorded	..	..	.....	21,700
Monthly Flow for the Year of 1910:				
March	19	9.0	a12.4	762
April	54	10.0	21.3	1,270
May	54	9.0	30.2	1,860
June	15	5.2	10.4	619
July	12	2.0	7.14	439
August	20	3.5	9.24	568
September	24	6.9	a14.2	845
Total Recorded	..	...	..	6,360

SOUTH FORK OF BIG TIMBER CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
January	..	..	b5.00	307
February	..	..	b5.00	278
March	16	7.0	b9.16	563
April	16	5.2	9.08	540
May	136	7.0	36.6	2,250
June	220	34	124	7,380
July	34	7.0	19.8	1,220
August	54	7.0	17.7	1,090
September	16	7.0	11.3	672
October	9.5	7.0	7.32	450
November	7.0	7.0	b7.00	417
December	...	...	b5.00	307
Total Recorded	220	...	21.3	15,500
Mean Monthly Flow for the Period of Record:				
January	..	...	5.00	307
February	..	...	5.00	278
March	19	2.0	7.87	484
April	54	4.0	13.2	786
May	260	3.0	42.1	2,590
June	550	5.2	155	9,220
July	340	2.0	80.6	4,960
August	187	3.0	24.2	1,490
September	119	2.0	15.9	946
October	28	6.0	10.6	652
November	..	...	9.26	551
December	..	...	5.00	307
Mean Yearly	550	...	31.1	22,600

a—Estimated March 1 to 7, and September 26 to 30, 1910.
b—Estimated January 1 to March 5, and November 12 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

BOULDER RIVER.

Observation Station Located in S. E. ¼ Sec. 14, T. 3 S., R. 12 E., Four Miles North of Contact, Mont.

Established in 1910.
Elevation of Station, 5,200 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 236 square miles.
Character of Basin: Very steep mountains, timbered.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
May	2,120	310	1,060	65,200
June	2,440	545	1,380	82,100
July	904	331	475	29,200
August	331	39	131	8,060
September	170	86	150	8,930
October	139	98	115	7,070
November	106	64	89.9	5,350
December	64	32	a42.3	2,600
Total Recorded	..	..	.....	209,000
Monthly Flow for the Year of 1911:				
January	..	..	b30.0	1,840
February	..	..	b35.0	1,940
March	78	52	66.5	4,090
April	195	60	88.9	5,290
May	830	228	564	34,700
June	3,850	1,520	2,710	161,000
July	1,940	615	1,130	69,500

BOULDER RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
August	675	150	308	18,900
September	156	112	131	7,800
October	180	112	153	9,410
November	...	...	b96.0	5,710
December	...	...	b65.0	4,000
Total Recorded	3,850	...	448	324,000

a—Estimated December 17 to 31, 1910.
b—Estimated January 1 to February 28, and November 12 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 286 and 306.

EAST BOULDER.

Observation Station Located in T. 3 S., R. 13 E., Four Miles Above McLeod, Mont.

Established in 1907.

Elevation of Station, 5,000 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 85 square miles.

Character of Drainage Basin: A high plateau (elevation 9,000 feet) and mountains and small valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
August, 13–31	89	41	59.5	2,240
September	55	36	41.9	2,490
October	48	28	34.1	2,100
November	33	16	23.1	1,370
December, 1–15	21	16	16.7	497
Monthly Flow for the Year of 1908:				
March	12	6	9.97	613
April	89	6	20.1	1,200
May	375	16	107	6,580
June	908	215	470	28,000
July	860	90	286	17,600
August	77	38	47.7	2,930
September	38	23	32.0	1,900
October	51	35	38.7	2,380
November	38	23	32.3	1,920
Total Recorded	..	..	....	63,100
Monthly Flow for the Year of 1909:				
March	21	18	20.9	1,290
April	18	18	18.0	1,070
May	564	18	95.1	5,850
June	952	205	493	29,300
July	415	50	149	9,160
August	59	28	39.0	2,400
September	79	28	49.3	2,930
October	42	35	41.3	2,540
November	35	28	32.2	1,920
December, 1–7	28	28	28.0	389
Total Recorded	..	..	....	56,800
Mean Monthly Flow for the Recorded Period:				
March	21	6	15.4	947
April	89	6	19.0	1,130
May	564	16	101	6,210
June	952	205	482	28,700
July	860	50	218	13,400
August	89	28	46.0	2,830
September	79	23	41.1	2,450
October	51	28	38.0	2,340
November	38	16	29.2	1,740
December	28	16	20.3	1,250
Mean Yearly	..	..	84.2	61,000

Note—A measurement on May 31, 1911, gave a discharge of 15.7 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266 and 306.

WEST BOULDER.

Observation Station Located in T. 3 S., R. 12 E., Seven Miles East of Bruffeys, Mont.

Established in 1904.
Elevation of Station, 5,500 feet.
Elevation of Head Waters, 10,000 feet.
Drainage Area, 94 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1904:				
May, 17-31	1,030	250	684	20,400
June	1,610	538	1,030	61,300
July	1,350	286	748	46,000
August	412	98	208	12,800
September	138	66	105	6,250
October	86	66	68.9	4,240
November	66	37	42.5	2,530
Total Recorded	..	..	....	154,000
Monthly Flow for the Year of 1905:				
March	37	27	28.5	1,750
June, 20 days	1,590	460	893	35,400
July	842	229	531	32,600
August	208	20	84.7	5,210
September	86	37	53.6	3,190
October	76	37	55.9	3,440
November	50	37	37.7	2,240
Total Recorded	..	..	....	83,800
Monthly Flow for the Year of 1906:				
March—a	58	20	30.3	1,860
April	229	27	82.5	4,910
May	558	124	360	22,100
June	1,310	295	853	50,800
July, 1-13	918	558	678	17,500
October, 14-31	76	50	62.1	2,220
November	76	50	53.3	3,170
Total Recorded	..	..	....	103,000
Monthly Flow for the Year of 1907:				
March	50	27	39.0	2,400
April	86	37	56.3	3,350
May	525	60	250	15,400
June	1,310	492	868	51,600
July	1,590	492	918	56,400
August	525	35	263	16,200
September	132	66	102	6,070
October	105	50	69.0	4,240
November—a	50	35	38.3	2,280
Total Recorded	..	..	....	158,000
Monthly Flow for the Year of 1908:				
March, 7-31	44	26	38.0	1,880
April	171	26	74.8	4,450
May	745	86	198	12,200
June	1,530	460	851	50,600
July	1,510	400	743	45,700
August	448	27	133	8,180
September	86	27	51.2	3,050
October	63	20	34.1	2,100
November	50	27	41.6	2,480
December, 1-19	50	37	43.8	1,650
Total Recorded	..	..	....	132,000
Monthly Flow for the Year of 1910:				
March	103	35	49.4	3,040
April	630	42	185	11,000
May	890	190	488	30,000
June	1,400	323	613	36,500
July	373	110	198	12,200
August—a	110	53	75.3	4,630
Total Recorded	..	..	....	97,400

WEST BOULDER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Mean Monthly Flow for the Period of Record:				
March	103	20	37.0	2,280
April	630	26	99.6	5,930
May	1,030	60	364	22,400
June	1,610	295	849	50,500
July	1,590	110	632	38,900
August	525	20	153	9,410
September	138	27	78.0	4,640
October	105	20	57.5	3,540
November	76	27	42.7	2,540
Mean	1,610	20	257	140,000

a—Discharge estimated March 11-25, 1906; November 1-2, 1907; and August 28-31, 1910.

Note—Gage heights are published for the month of December, 1909, and the following measurements made: June 13, 484 sec.-ft.; September 8, 119 sec.-ft.; and November 23, 68 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266 and 286.

WEST BOULDER

Observation Station Located in S. E. ¼ Sec. 16, T. 2 S., R. 13 E., at McLeod, Mont.

Established in 1907.

Elevation of Station, 4,700 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 137 square miles.

Character of Drainage Basin: Mountainous, and a narrow valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
May, 4-31	715	73	264	14,700
June	1,190	462	815	48,500
July	1,680	479	902	55,500
August	479	128	249	15,300
September	172	76	105	6,250
October	96	67	75.2	4,620
November	67	61	63.1	3,750
December	67	..	54.4	3,340
Total Recorded	..	..	....	152,000
Monthly Flow for the Year of 1908:				
March, 20-31	60	34	43.2	1,030
April	264	33	109	6,490
May	652	114	271	16,700
June	1,420	489	863	51,400
July	1,620	337	776	47,700
August	284	88	170	10,500
September	77	57	66.2	3,940
October	103	60	78.1	4,800
Total Recorded	..	..	....	143,000
Monthly Flow for the Year of 1909:				
April	73	22	37.2	2,210
May	1,190	44	261	16,000
June	1,990	543	1,190	70,800
July	1,280	264	564	34,700
August	264	73	117	7,190
September	165	73	128	7,620
October	165	73	94.5	5,810
November	114	57	69.6	4,140
Total Recorded	...	...	....	148,000
Monthly Flow for the Year of 1910:				
June	1,370	440	671	39,900
July	390	69	186	11,400

WEST BOULDER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
August	69	28	42.1	2,590
September	105	50	73.3	4,360
October	85	69	71.3	4,380
November	69	56	60.4	3,590
December—a	69	33	43.5	2,670
Total Recorded	..	..	....	67,600
Monthly Flow for the Year of 1911:				
January	..	..	b20	1,230
February	..	..	b20	1,110
March	56	..	b37.0	2,280
April	105	45	60.1	3,580
May	660	105	324	19,900
June	1,670	600	1,060	63,100
July	600	160	322	19,800
August	248	69	127	7,810
September	85	62	72.0	4,280
October	85	69	77.3	4,750
November	77	..	b54.6	3,250
December	..	..	b35	2,150
Total Recorded	1,670	..	185	133,000
Mean Monthly Flow for the Period of Record:				
January	...	...	20.0	1,230
February	...	...	20.0	1,110
March	...	...	38.8	2,390
April	264	22	68.8	4,090
May	1,190	44	280	17,200
June	1,990	440	920	54,700
July	1,680	69	550	33,800
August	479	28	141	8,670
September	172	50	88.9	5,290
October	165	60	79.3	4,880
November	114	..	61.9	3,680
December	...	..	44.3	2,72
Mean Yearly	1,990	22	193	140,000

a—Discharge estimated December 11 to 31, 1910, on basis of measurement made December 16.
b—Estimated November 1 to March 14, and November 16 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.

SWEETGRASS CREEK.

Observation Station Located in S. W. ¼ Sec. 24, T. 5 N., R. 12 E., 16 Miles Above Melville, Mont.

Established in 1907.
Elevation of Station, about 5,900 feet.
Elevation of Head Waters, 9,500 feet.
Drainage Area, 47 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
May, 5-31	438	36	136	7,280
June	810	255	466	27,700
July	885	266	477	29,300
August	350	81	158	9,720
September	71	46	59.0	3,510
October	39	28	34.1	2,100
November	28	28	28.0	1,670
December	28	28	28.0	944
Total Recorded	..	..	....	82,200

SWEET GRASS CREEK (Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April	16	16	16.0	952
May	665	16	122	7,500
June	1,490	180	529	31,500
July	780	132	315	19,400
August	112	56	b79.5	4,890
September	...	..	b44.0	2,620
October	50	22	33.9	2,080
November	56	40	47.4	2,820
Total Recorded	..	..	....	71,800
Monthly Flow for the Year of 1909:				
April	12	11	11.7	696
May	559	12	112	6,890
June	1,410	224	530	31,500
July	584	120	215	13,200
August	120	60	84.1	5,170
September	134	60	90.1	5,360
October	80	60	72.9	4,480
November	60	30	40.8	2,430
Total Recorded	..	..	....	69,700
Monthly Flow for the Year of 1910:				
January	..	..	a22	1,350
February	..	..	a19	1,060
March	20	18	a19.0	1,170
April	401	16	63.1	3,750
May	477	139	258	15,900
June	415	139	236	14,000
July	142	62	91.4	5,620
August	62	28	43.8	2,690
September	88	26	43.9	2,610
October	90	60	80.5	4,950
November	56	26	39.8	2,370
December	26	20	a23.0	1,410
Total Recorded	..	..	78.3	56,900
Monthly Flow for the Year of 1911:				
January	..	..	c12	738
February	..	..	c12	666
March	..	..	c11.8	726
April	20	8.6	11.4	678
May	775	13	145	8,920
June	1,340	198	524	31,200
July	225	83	145	8,920
August	94	51	73.7	4,530
September	51	27	36.0	2,140
Total Recorded	..	..	....	58,500
Mean Monthly Flow for the Period of Record:				
January	...	...	17.0	1,050
February	...	...	15.5	861
March	...	...	15.4	947
April	401	8.6	25.6	1,520
May	775	12	155	9,530
June	1,490	139	457	27,200
July	885	62	249	15,300
August	350	28	87.8	5,400
September	134	26	54.6	3,250
October	90	22	55.4	3,410
November	60	26	39.0	2,320
December	28	20	25.5	1,570
Mean Yearly	1,490	8.6	99.7	72,400

a—Estimated January 1 to March 12, and December 26 to 31, 1910.
b—Discharges interpolated August 20 to September 30, 1908.
c—Estimated January 1 to March 15, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 246, 266, 286 and 306.
Data Compiled from U. S. Irrigation Investigation.
Water Rights Decreed on Stream, 20,587 inches in 112 decrees in year of 1906.

SWEETGRASS CREEK.

Observation Station Located in T. 4 N., R. 15 E., Six Miles Below Melville, Mont.

Established in 1909.
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 9,500 feet.
Drainage Area, 140 square miles.
Character of Drainage Basin: Mountains and broad benches.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April	30	19	27.9	1,660
May	480	13.5	114	7,010
June	988	266	474	28,200
July	392	73	142	8,730
August	91	43	58.8	3,620
September	153	73	104	6,190
October	113	73	93.6	5,760
November, 1–6	82	73	79.0	940
Total Recorded	.....	.....	.....	62,100
Monthly Flow for the Year of 1910:				
April	371	30	87.4	5,200
May	386	89	191	11,700
June	267	67	157	9,340
July	67	16	35.4	2,180
August	40	23	27.8	1,710
September	95	23	45.6	2,710
October	105	52	75.9	4,670
November	76	40	50.1	2,980
December	.....	.....	a56	3,440
Total Recorded	.....	.....	.....	43,900
Monthly Flow for the Year of 1911:				
January	.....	.....	b30	1,840
February	.....	.....	b25	1,390
March	.....	.....	b21.8	1,340
April	38	19	30.8	1,830
May	1,560	19	223	13,700
June	1,260	112	482	28,700
July	112	66	82.5	5,070
August	82	45	64.7	3,980
Total Recorded	.....	.....	.....	57,800

a—Estimated by measurement of Dec. 13, and comparison with upper station.
b—Estimated Jan. 1 to March 27, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 266, 286 and 306.

SWEETGRASS CREEK.

Observation Station Located 9 Miles Below Melville, Mont.

Established in 1907.
Elevation of Station, 4,600 feet.
Elevation of Head Waters, 9,500 feet.
Drainage Area, 154 square miles.
Character of Drainage Basin: Mountains and broad benches.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1907:				
May, 4–31	326	52	140	7,780
June	1,120	242	424	25,200
July	607	290	434	26,700
August	300	66	164	10,100
September	98	45	64.8	3,860
October	70	39	48.7	2,990
November, 1–23	39	39	39.0	1,780
Total Recorded	.....	.....	.....	78,400

SWEET GRASS CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April	20	14	16.1	958
May	855	16	127	7,810
June	1,330	205	600	35,700
July	508	43	242	14,900
August	35	11	22.7	1,400
September	33	16	24.6	1,460
October—a	77	33	56.0	3,440
November, 1–7	77	68	70.1	973
Total Recorded	.....	.....	.....	66,600

a—Discharge interpolated Oct. 18–24, 1908.
Reference for daily flow in U. S. G. S. Water Supply paper No. 246.

STILLWATER RIVER NEAR NYE, MONTANA.

This station was established August 12, 1911, at Wood's ranch about 7 miles above Nye, but daily gage heights were not read. The following measurements have been made.

Aug. 29, 1911 .....Discharge 213 second-feet.
Jan. 16, 1912 .....Discharge 52 second-feet.

Reference—U. S. G. S. Water Supply Paper 306.

STILLWATER RIVER.

Observation Station Located in T. 3 S., R. 19 E., Near Absarokee, Mont.

Established in 1910.
Elevation of Station, 3,950 feet.
Drainage Area, 923 square miles.
Character of Drainage Basin: Forested mountains, benchlands and valleys .

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
July, 19–31	2,860	1,230	1,890	48,700
August	1,180	465	801	49,300
September	965	415	574	34,200
October	520	415	455	28,000
November	465	330	401	23,900
Total Recorded	.....	.....	.....	184,000
Monthly Flow for the Year of 1911:				
May, 18–31	1,870	801	1,230	34,100
June	6,410	2,950	4,330	258,000
July	3,810	1,520	2,540	156,000
August	1,870	635	1,240	76,200
September	750	411	576	34,300
October	445	249	370	22,800
November	.....	.....	a305	18,100
December	.....	.....	a250	15,400
Total Recorded	.....	.....	.....	615,000

a—Estimated Nov. 12 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 286, and 306.

WOODBINE CREEK NEAR NYE, MONTANA.

This station was established about 7 miles above Nye, August 12, 1911, but daily gage heights were read. The following measurements have been made.

Aug. 12, 1911 .....Discharge 47 second-feet.
Aug. 29, 1911 .....Discharge 31 second-feet.
Jan. 16, 1912 .....Discharge 4.6 second-feet.

Reference: U. S. G. S. Water Supply paper 306.

ROSEBUD RIVER.

Observation Station Located in S. E. ¼ Sec. 36, T. 3 S., R. 18 E., at Absarokee, Mont.

Established in 1910.

Elevation of Station, 4,000 feet.

Drainage Area, 383 square miles.

Character of Drainage Basin: Varies from forested mountains to cultivated benches and valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
July 19–31	1,800	910	1,180	30,400
August	910	299	518	31,900
September	1,390	209	462	27,500
October	532	209	250	15,400
November	252	209	220	13,100
December	276	250	261	16,000
Total Recorded	.....	.....	.....	134,000
Monthly Flow for the Year of 1911:				
January	.....	.....	a150	9,220
February	.....	.....	a100	5,550
March	300	.....	a154	9,470
April	260	135	173	10,300
May	2,270	225	581	35,700
June	3,550	840	2,090	124,000
July	1,980	990	1,490	91,600
August	1,450	440	826	50,800
September	540	.....	a405	24,100
October	.....	.....	a250	15,400
November	.....	.....	a135	8,030
December	.....	.....	a100	6,150
Total Recorded	.....	.....	538	390,000

a—Estimated Jan. 1 to Mar. 11, and Sept. 15 to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 286 and 306.

CLARKE FORK RIVER.

Observation Station Located in Sec. 21, T. 5 S., R. 23 E., at Fromberg, Mont.
Established in 1905.
Elevation of Station, about 3,530 feet.
Elevation of Head Waters, 10,500 feet.
Drainage Area, 2,500 square miles.
Character of Drainage Basin: Rises in high mountains, cultivated valley near mouth.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1905:				
June, 3–30	6,260	2,290	4,370	243,000
July	4,360	1,430	2,570	158,000
August	1,880	554	927	57,000
September	602	321	418	24,900
October	458	321	378	23,200
November, 1–27	458	400	407	21,800
Total Recorded	...	...	...	528,000
Monthly Flow for the Year of 1906:				
April	1,240	346	587	54,900
May	3,530	520	1,990	122,000
June	6,260	1,760	2,980	177,000
July	3,680	954	2,450	151,000
August	3,230	660	1,110	68,200
September	738	346	488	29,000
October	429	273	330	20,300
November	400	296	343	20,400
December, 1–10	...	...	400	7,930
Total Recorded	...	...	...	651,000
Monthly Flow for the Year of 1907:				
February, 15–28	458	412	455	13,500
March	520	321	405	24,900
April	821	357	533	31,700
May	4,460	587	2,070	127,000
June	8,020	3,400	5,220	311,000
July	10,700	3,520	6,140	378,000
August	3,610	1,040	1,910	117,000
September	1,340	555	919	54,700
October	1,040	430	550	33,800
November	430	325	371	22,100
December	375	325	332	20,400
Total Recorded				1,130,000
Monthly Flow for the Year of 1908:				
February, 17–28	195	195	195	4,640
March	325	195	294	18,100
April	2,160	275	758	45,100
May	3,880	820	1,730	106,000
June	7,480	2,640	4,500	268,000
July	8,210	2,100	4,180	257,000
August	2,160	860	1,520	93,500
September	945	555	656	39,000
October	780	555	645	39,700
November	555	325	462	27,500
December, 1–16	375	325	353	11,200
Total Recorded	...	...	...	910,000
Monthly Flow for the Year of 1909:				
March	430	325	359	22,100
April	375	275	319	19,000
May	6,760	350	1,810	111,000
June	11,200	5,740	8,430	502,000
July	12,100	1,560	4,880	300,000
August	1,560	820	1,260	77,500
September	1,680	555	878	52,200
October	522	350	430	26,400
November	300	300	300	17,900
Total Recorded	...	...	...	1,130,000
Monthly Flow for the Year of 1910:				
January	.....	...	a300	18,400
February	.....	...	a350	19,400
March	1,040	370	653	40,200
April	1,820	370	868	51,600
May	4,430	1,940	2,700	166,000

CLARKE FORK RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
June	6,360	2,220	4,470	266,000
July	2,160	990	1,370	84,200
August	945	370	560	34,400
September	590	320	365	21,700
October	370	320	326	20,000
November	430	270	324	19,300
December	430	270	330	20,300
Total Recorded	...	...	1,050	762,000
Monthly Flow for the Year of 1911:				
January	...	...	b250	15,400
February	...	...	b275	15,300
March	375	275	b322	19,800
April	700	325	406	24,200
May	3,700	555	2,280	140,000
June	9,710	2,860	6,870	409,000
July	6,230	1,440	2,770	170,000
August	2,040	555	919	56,500
September	490	430	441	26,200
October	430	350	427	26,300
November	490	...	415	24,700
December	...	...	b300	18,400
Total Recorded	9,710	...	1,310	946,000
Mean Monthly Flow for the Period of Record:				
January	.....	...	275	16,900
February	.....	...	321	17,800
March	1,040	195	407	25,000
April	2,160	275	578	34,400
May	6,760	350	2,100	129,000
June	11,200	1,760	5,260	313,000
July	12,100	954	3,480	214,000
August	3,610	370	1,170	71,900
September	1,680	320	595	35,400
October	1,040	273	441	27,100
November	555	270	374	22,300
December	...	...	332	20,400
Mean Yearly	12,100	...	1,280	927,000

a—Estimated.
b—Estimated January 1 to March 4, and November 10 to December 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. (172, 208, 246, 266) 286 and 306.
Note—Data prior to 1910 has been revised and republished in Water Supply Paper 286.

PRYOR CREEK AT COBURN,, MONT.

This station was established September 13, 1911. A measurement on September 13 showed a discharge of 23 second-feet.

Reference: U. S. G. S. Water Supply Paper 306.

PRYOR CREEK.

Observation Station Located in T. 2 N., R. 28 E., at Huntley, Mont.

Established in 1904.
Elevation of Station, about 3,050 feet.
Drainage Area, 800 square miles.
Character of Drainage Basin: Rolling prairie.

Month.	Discharge in Second-feet.				Run-off.	
	Maximum	Minimum	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
August, 7-31	16	6	8.9	0.011	441	0.01
September	18	13	16.1	.020	958	.02
October	33	16	24.7	.031	1,520	.04
November	54	18	30.8	.038	1,830	.04
December	51	25	34.1	.043	2,100	.05
Total Recorded	..	..	....	....	6,850	...
Monthly Flow for the Year of 1905:						
January, 1-7	45	30	37.3	.047	516	.01
March, 9-31	70	33	43.3	.054	1,980	.05
April	70	23	39.4	.049	2,340	.06
May	259	30	77.8	.097	4,780	.11
June	1,370	76	222	.278	13,200	.31
July	594	13	78.2	.098	4,810	.11
August	39	9	15.2	.019	935	.02
September	57	13	16.6	.021	988	.02
October	83	23	44.4	.056	2,730	.06
November	51	33	39.0	.049	2,090	.05
Total Recorded	..	..	....	....	34,400	...
Monthly Flow for the Year of 1906:						
April	339	50	96.8	.121	5,760	.14
May	304	34	75.9	.095	4,670	.11
June	68	11	35.0	.044	2,080	.05
July	17	6	9.8	.012	603	.01
August	237	8	29.5	.037	1,810	.04
September	28	17	18.6	.023	1,110	.03
October	24	11	22.8	.028	1,400	.03
November—a	..	..	24.0	.030	1,430	.03
Total Recorded	..	..	....	....	18,900	...
Monthly Flow for the Year of 1907:						
February, 15-28 (b)	592	18	257	.321	7,140	.17
March	51	10	21.2	.026	1,300	.03
April	95	15	36.8	.046	2,190	.05
May	555	46	111	.139	6,820	.16
June	90	24	58.6	.073	3,490	.08
July	131	20	42.4	.053	2,610	.06
August	21	15	18.1	.023	1,110	.03
September	24	15	18.1	.023	1,080	.03
October	149	15	25.3	.032	1,560	.04
November, 1-14	15	15	15.0	.019	416	.01
Total Recorded	..	..	....	....	27,700	...
Monthly Flow for the Year of 1908:						
March, 21-31	36	27	30.2	.038	659	.02
April	218	15	62.7	.078	3,730	.09
May	630	36	184	.230	11,300	.27
June	329	36	89.2	.112	5,310	.12
July	36	0	20.6	.026	1,270	.03
August	15	8	11.5	.014	707	.02
September	20	15	15.7	.020	934	.02
October	115	19	33.0	.041	2,030	.05
November	46	26	34.8	.044	2,070	.05
Total Recorded	..	..	....	....	28,000	....
Monthly Flow for the Year of 1909:						
March, 25-31	90	46	61.9	.077	859	.02
April	84	46	57.4	.072	3,420	.08
May	555	56	120	.150	7,380	.17
June	156	38	75.9	.095	4,520	.11

PRYOR CREEK—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
July	38	19	27.9	.035	1,720	.04
August, 1-8	990	16	140	.175	2,220	.05
September, 5 days	33	10	17.0	.021	168	.004
October	29	10	18.7	.023	1,150	.03
November	33	22	24.4	.030	1,450	.03
Total Recorded	..	..	....	....	22,900	...
Monthly Flow for the Year of 1910:						
January	..	..	c25	.031	1,540	.04
February	..	..	c30	.038	1,670	.04
March	109	40	c84.1	.105	5,170	.12
April	79	48	58.6	.073	3,490	.08
May	318	48	103	.129	6,330	.15
June	79	20	42.7	.053	2,540	.06
July	48	1	16.4	.020	1,010	.02
August	24	5	9.24	.012	568	.01
September	254	12	54.3	.068	3,230	.08
October	68	34	42.5	.053	2,610	.06
November	68	38	44.5	.055	2,650	.06
December	58	38	47.2	.059	2,900	.07
Total Recorded	318	1	42.1	.058	33,100	.79
Monthly Flow for the Year of 1911:						
January	..	..	d20	.025	1,230	.03
February	..	..	d22	.028	1,220	.03
March	194	22	d77	.096	4,730	.11
April	59	42	49.3	.062	2,930	.07
May	116	24	46.6	.058	2,870	.07
June	272	16	53.6	.067	3,190	.07
July	20	4	10.5	.013	646	.02
August	26	2	12.4	.016	762	.02
September	19	11	15.2	.019	904	.02
October	22	8	18.3	.023	1,130	.03
November	..	..	d20	.025	1,190	.03
December	..	..	d20	.025	1,230	.03
Total Recorded	272	2	30.4	.038	22,000	.55
Mean Monthly Flow for the Period of Record:						
January	..	..	23.8	.030	1,460	.03
February	..	..	b26.0	.033	1,440	.03
March	194	10	55.5	.070	3,410	.08
April	339	15	57.3	.072	3,410	.08
May	630	24	103	.129	6,330	.15
June	1,370	11	82.4	.103	4,900	.11
July	594	0	29.4	.037	1,810	.04
August	990	2	19.7	.025	1,210	.03
September	254	10	22.0	.028	1,310	.03
October	149	8	28.7	.036	1,760	.04
November	68	11	30.0	.038	1,790	.04
December	..	..	33.8	.042	2,080	.05
Mean Yearly	1,370	0	42.6	.532	30,900	.71

a—Latter part of November, 1906, estimated.
b—The discharge as published for February, 1907, is probably too high, due to ice conditions, and is not included in the mean.
c—Estimated January 1 to March 10, 1910.
d—Estimated.
Reference for daily flow in U. S. G. S. Water Supply papers 130, 172, 208, 246, 266, 286, and 306.

BIGHORN RIVER.

Observation Station Located in S. W. ¼ Sec. 13, T. 1 S., R. 33 E., Two Miles Above Hardin, Mont.

Established in 1904.
Elevation of Station, about 3,000 feet.
Elevation of Head Waters, 11,500 feet.
Drainage Area, 20,700 square miles.
Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
June, 16–30	25,290	13,940	20,670	0.998	615,000	0.56
July	17,540	8,010	12,260	.592	754,000	.68
August	7,532	2,506	4,583	.221	282,000	.26
September	3,920	1,700	2,449	.118	146,000	.13
October	1,860	1,620	1,728	.083	106,000	.10
November	1,700	1,400	1,558	.075	92,700	.08
Total Recorded	.....	.....	.....	....	2,000,000	...
Monthly Flow for the Year of 1905.						
January, 1–21	1,700	1,400	1,485	.072	61,800	.06
March, 4–31	4,200	1,960	1,957	.094	109,000	.10
April	1,896	1,200	1,440	.069	85,700	.08
May	14,060	1,700	4,318	.208	266,000	.24
June	24,460	11,460	17,420	.841	1,040,000	.94
July	15,960	5,400	9,143	.441	562,000	.51
August	5,400	2,440	3,486	.168	214,000	.19
September, 1–25	2,660	1,470	2,077	.100	103,000	.09
October, 2–31	5,080	1,700	2,202	.106	131,000	.12
November, 1–27	1,860	1,668	1,732	.084	92,800	.08
Total Recorded	.....	.....	.....	....	2,660,000	...
Monthly Flow for the Year of 1906:						
March, 26–31	18,400	4,530	10,500	.507	125,000	.11
April	5,560	2,870	3,800	.184	226,000	.20
May	16,400	3,300	8,720	.421	536,000	.48
June	26,800	8,250	13,600	.657	809,000	.73
July	15,300	6,370	11,000	.531	676,000	.61
August	13,300	3,970	6,290	.304	387,000	.35
September	4,960	2,040	3,070	.148	183,000	.16
October	1,900	1,400	1,640	.079	101,000	.09
November	1,850	1,510	1,690	.082	101,000	.09
Total Recorded	.....	.....	.....	.....	3,140,000	...
Monthly Flow for the Year of 1907:						
April	3,830	1,560	2,380	.115	142,000	.13
May	20,200	3,160	8,660	.418	532,000	.48
June	21,300	10,400	16,700	.807	994,000	.90
July	32,200	15,100	22,300	1.08	1,370,000	1.24
August	15,400	4,190	7,770	.375	478,000	.43
September	4,930	2,060	2,900	.140	173,000	.16
October	2,520	1,950	2,150	.104	132,000	.12
November	1,950	1,520	1,700	.082	101,000	.09
Total Recorded	.....	.....	.....	....	3,920,000	...
Monthly Flow for the Year of 1908:						
March, 21–31	1,960	1,460	1,720	.083	37,500	.03
April	5,300	1,220	2,740	.132	163,000	.15
May	9,410	2,770	5,620	.271	346,000	.31
June	40,800	12,700	22,600	1.09	1,340,000	1.22
July	21,300	8,440	14,600	.705	898,000	.81
August	8,440	8,140	6,230	.301	383,000	.35
September	3,780	2,200	2,770	.134	165,000	.15
October	3,780	2,200	2,850	.138	175,000	.16
November	2,470	1,380	1,930	.093	115,000	.10
Total Recorded	.....	.....	.....	....	3,620,000	...

BIGHORN RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1909:						
March	9,100	3,230	5,790	.280	356,000	.32
April	3,480	1,710	2,110	.102	126,000	.11
May	9,960	2,060	4,410	.213	271,000	.25
June	33,800	10,400	22,200	1.07	1,320,000	1.13
July	35,900	8,080	17,000	.821	1,050,000	.95
August	7,690	4,130	5,440	.263	334,000	.30
September	7,310	2,450	4,580	.221	273,000	.25
October	2,450	2,060	2,250	.109	138,000	.13
November	3,860	1,880	2,370	.114	141,000	.13
December, 1–12	3,350	2,450	2,890	.139	68,800	.06
Total Recorded	.....	.....	.....	.....	4,080,000	.....
Monthly Flow for the Year of 1910:						
January	.....	.....	a1,700	.082	104,000	.09
February	.....	.....	a1,800	.087	100,000	.09
March	.....	.....	a4,200	.203	258,000	.24
April	10,200	2,440	4,250	.205	253,000	.23
May	12,000	6,700	8,940	.432	550,000	.50
June	11,600	6,360	8,770	.424	522,000	.47
July	7,410	4,800	5,630	.272	346,000	.31
August	.....	.....	3,450	.167	212,000	.19
September	3,040	1,350	2,070	.100	123,000	.11
October	2,330	1,440	1,680	.081	103,000	.09
November	2,110	1,620	1,760	.085	105,000	.10
December	.....	.....	1,650	.080	101,000	.09
Total Recorded	.....	.....	3,820	.185	2,780,000	2.51
Monthly Flow for the Year of 1911:						
January	.....	.....	1,000	.048	61,500	.06
February	.....	.....	1,200	.058	66,600	.06
March	2,170	.....	1,690	.082	104,000	.09
April	1,990	1,370	1,820	.088	108,300	.10
May	6,050	1,900	3,600	.174	221,000	.20
June	22,400	5,380	13,900	.672	827,000	.75
July	12,200	6,220	8,500	.411	523,000	.47
August	6,220	3,870	4,980	.241	306,000	.28
September	3,870	1,880	2,960	.143	176,000	.16
October	2,250	1,560	1,900	.092	117,000	.1[illegible]
November	1,880	870	1,210	.058	72,000	.06
December	.....	.....	1,000	.048	61,500	.06
Total Recorded	22,400	.....	3,660	.177	2,640,000	2.40
Mean Monthly Flow for the Period of Record:						
January	.....	.....	1,380	.067	84,800	.08
February	.....	.....	1,500	.072	83,300	.07
March	18,400	.....	3,630	.175	223,000	.20
April	10,200	1,200	2,650	.128	158,000	.14
May	20,200	1,700	6,320	.305	389,000	.35
June	40,800	5,380	16,700	.808	994,000	.90
July	35,900	4,800	12,600	.609	775,000	.70
August	15,400	2,440	5,280	.255	325,000	.29
September	7,310	1,350	2,870	.139	171,000	.16
October	5,080	1,400	2,050	.099	126,000	.11
November	3,860	870	1,740	.084	104,000	.09
December	.....	.....	1,580	.076	97,200	.09
Mean Yearly	40,800	870	4,860	.235	3,530,000	3.18

a—Estimated Jan. 1 to Mar. 7, and Dec. 11 to 31, 1910.
b—Estimated Jan. 1 to Mar. 20, and Nov. 13, to Dec. 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 130, 172, 208, 246 266, 286 and 306.

LITTLE BIGHORN RIVER.

Observation Station Located at Crow Agency, Mont.

Established in 1905.
Elevation of Station, 3,040 feet.
Elevation of Head Waters, 9,500 feet.
Drainage Area, 1,280 square miles.
Character of Drainage Basin: Mountains and rolling prairie.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
March, 24-31	105	105	105	0.082	1,670	0.025
April	155	80	117	.092	6,960	.10
May	470	105	235	.184	14,400	.21
June	1,740	550	977	.766	58,100	.86
July—a	720	185	346	.270	21,300	.31
August	155	80	125	.098	7,690	.11
September	105	60	78	.061	4,610	.07
October	130	80	109	.085	6,700	.10
November	155	80	124	.097	7,380	.11
December—a	.....	.....	130	.102	7,990	.12
Total Recorded	.....	.....	.....	.....	137,000	.....
Monthly Flow for the Year of 1906:						
Janaury, 1-13	215	185	203	.159	5,230	.077
March	1,800	110	476	.372	29,300	.43
April	630	185	290	.226	17,300	.25
May	2,740	155	543	.424	33,400	.49
June	675	285	475	.372	28,300	.42
Total Recorded	.....	.....	.....	.....	114,000	.....

a—Approximate.

Note—Measurements were made on the Little Bighorn River near Crow Agency in 1904 as follows:
July 26, 179 sec.-ft.; Sept. 17, estimated 250 sec.-ft.; Sept. 28, 65 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 130, 172 and 208.

MISCELLANEOUS MEASUREMENTS IN YELLOWSTONE RIVER DRAINAGE BASIN IN MONTANA.

Date.	Stream.	Tributary To—	Locality.	Discharge Sec.-ft.
Aug. 25, 1875	Yellowstone	Missouri	Yellowstone Lake, (Wyo.)	1,200
Sept. 1, 1886	do	do	do	1,520
Sept. 7, 1886	do	do	do	1,020
Oct. 9, 1889	do	do	do	583
Aug. 24, 1889	do	do	Springdale, Mont.	2,110
Sept. 5, 1889	do	do	do	1,930
Oct. 3, 1889	do	do	do	1,580
Aug. .., 1879	do	do	Above mouth of Bighorn	7,470
Aug. .., 1879	do	do	Below mouth of Bighorn	13,300
Sept. 1878	do	do	Fort Keough	14,500
Oct. 1879	do	do	do	6,500
Sept. 1878	do	do	Below mouth of Powder River	11,200
Oct. 1878	do	do	Thirty miles above mouth of Yellowstone	8,160
Aug. 3, 1889	Shields River	Yellowstone	Flathead Creek	25
Aug. 3, 1889	do	do	Below Rock Creek	65
May 17, 1897	do	do	Near mouth	1,710
June 15, 1897	do	do	do	883
June 23, 1897	do	do	do	722
July 8, 1897	do	do	do	798
July 24, 1897	do	do	do	315
Aug. 5, 1897	do	do	do	117
Sept. 22, 1897	do	do	do	59
Aug. 3, 1889	Pine Creek	Shields River	Shields River	10
Aug. 3, 1889	Brackett Creek	do	do	10
Aug. 3, 1889	Rock Creek	do	do	15
Aug. 17, 1889	Big Timber Creek	Yellowstone	Big Timber road	40
Oct. 9, 1908	Boulder River	do	Contact	152
June 9, 1908	do	do	McLeod	1,260
Sept. 10, 1909	Sweetgrass Creek	Yellowstone	In canyon 8 miles above upper gaging station	25.2
Aug. 17, 1889	do	do	Big Timber road	35
June 1, 1905	Clarke Fork	do	Bridger	4,090
Oct. 6, 1889	Tongue River	do	Miles City	47

GENERAL FEATURES OF THE LITTLE MISSOURI RIVER DRAINAGE BASIN.

The Little Missouri River rises in northeastern Wyoming, crosses the southeastern corner of Montana into South Dakota, then flows northward and finally enters the Missouri River at the Fort Berthold Indian Reservation.

The length of the river itself in Montana is only about 40 miles, but its tributary streams drain the eastern border of the State as far north as Glendive. While the upper portion of the drainage area is mountainous, most of the basin is a rolling country with very little timber.

LITTLE MISSOURI RIVER AT ALZADA, MONT.

This station was established April 3, 1904, at the highway bridge one-half mile northeast of Alzada. It was moved April 17, 1906, to a footbridge back of Mr. King's house in Alzada, and discontinued November 30, 1906. Gage heights are published till November 30, but the only measurements made were 37 sec.-ft. on April 17; 10 sec.-ft. on May 15, and an estimate of 2 sec.-ft. on November 13, and a rating was not obtained. There were three periods of high water after the station was moved, occurring the first week in May, the last week in May, and the third week in August. The gage heights indicate that the stream was nearly dry for most of July, September, October and November, 1906.

Drainage Area, 600 square miles.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
April	1,185	4	127	0.212	7,560	0.236
May	280	4	51.6	.086	3,170	.099
June	1,744	7	314	.523	18,700	.584
July	31	2	7.1	.012	437	.014
August	27	0	2.0	.003	123	.003
September—a	488	0	30.0	.050	1,780	.056
October—a	37	0	4.1	.007	252	.008
November—a	1.4	1.4	1.4	.002	83	.002
Total Recorded	.....	.....	.....	.....	32,100	.....
Monthly Flow for the Year of 1905:						
March, 15–31	24	10	13.3	.022	449	.014
April	19	2	5.6	.009	333	.010
May	1,173	2	124	.207	7,620	.239
June	1,354	2	212	.353	12,600	.394
July	1,237	10	245	.408	15,100	.470
August	861	1	60.2	.100	3,700	.115
September	411	1	22.6	.038	1,340	.042
October	340	1	35.4	.059	2,180	.068
November	1	1	1.0	.002	60	.00
Total Recorded	.....	.....	.....	.....	43,400	.....
Monthly Flow for the Year of 1906:						
March, 11–31—a	1,850	75	550	.917	22,900	.716

a—Approximate.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 130, 172, 208.

LITTLE MISSOURI RIVER NEAR ALZADA.

This station was established June 18, 1911, at Walker's ranch, four miles below Alzada, two miles below the mouth of Thompson Creek, and 300 yards below a proposed damsite for the Little Missouri Carey project.

The discharge on June 18, 1911, was estimated to be 1.5 second-feet.

Reference: U. S. G. S. Water Supply paper 306.

GENERAL FEATURES OF THE KOOTENAI RIVER DRAINAGE BASIN.

The Kootenai River rises in British Columbia, flows south into Montana for about fifty miles, and turns in a northwesterly direction, flowing about forty miles farther before crossing the line into the State of Idaho. It drains the northwestern corner of Montana and is a tributary of the Columbia River. This drainage basin is precipitous and mountainous in character, and has a very heavy rainfall. While the mean annual precipitation in some of the valley towns varies from 18 to 25 inches, at a mountain station the record averages over 66 inches.

Power developments are now being undertaken on the Kootenai River.

KOOTENAI RIVER.

Observation Station Located in Sec. 3, T. 30 N., R. 31 W., Near Libby, Mont.
Established in 1910.
Character of Drainage Basin: Mountainous, heavily forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Estimated Monthly Flow for the Year of 1910:				
October, 13 to 31	12,100	8,000	9,850	372,000
November	11,600	6,350	8,510	506,000
December	6,350	.....	a5,100	314,000
Estimated Monthly Flow for the Year of 1911:				
January, 1 to 11	4,190	3,000	3,700	80,800
March, 8 to 31	8,000	3,750	5,470	260,000
April	29,100	6,350	12,000	714,000
May, 18 days	b30,000	21,900	b25,400	b903,000
July, 22 to 31	b25,800	19,600	b22,000	b437,000
August	19,600	9,200	13,400	824,000
September	10,100	6,650	8,220	489,000
October	6,650	4,900	5,870	361,000
November, 1–18	5,450	4,620	4,830	172,000
Total Recorded	.....	.....	.....	4,240,000

a—Estimated Dec. 30–31, 1911.

b—Discharge too high to estimate May 6 to 10, 12, 17 to 23 and June 1 to July 21, 1911.

Note—The above estimates are provisional as the available discharge measurements do not give a reliable rating.

References, U. S. G. S. Water Supply Papers 292 and 312.

CALLAHAN CREEK NEAR TROY, MONTANA.

This station was established June 11, 1911 in Sec. 13 T. 31 N., R. 34 W., and a few gage heights were obtained during the period from June to October.

Discharge measurements were made duriing 1911 as follows:

Mar. 12 .....Discharge, 57 second-feet.
June 11 .....Discharge, 618 second-feet.
August 1 .....Discharge, 34 second-feet.
September 27 .....Discharge, 32 second-feet.
November 11 .....Discharge, 24 second-feet.

References: U. S. G. S. Water Supply Paper No. 312.

YAHK RIVER.

Observation Station Located in Sec. 33, T. 34 N., R. 33 W., One-half Mile Above Falls, Near Troy, Montana.

This station was established Oct. 15, 1910. Gage heights were read during 1911 at intervals of about once a week. The following measurements of discharge were made:

October 15, 1910 ..... 232 second-feet.
March 14, 1911 ..... 349 second-feet.
August 2, 1911 ..... 345 second-feet.
September 28, 1911 ..... 258 second-feet.
October 12, 1911 ..... 211 second-feet.

References: U. S. G. S. Water Supply Papers Nos. 292 and 312.

MISCELLANEOUS MEASUREMENTS IN KOOTENAI RIVER DRAINAGE BASIN IN MONTANA.

Date.	Stream.	Tributary To—	Locality.	Discharge Sec.-ft.
Oct. 10 1911	Libby Creek	Kootenai River ..	Libby	75
Oct. 11 1911	Rankin Creek	.....do	Rankin	5.4
March 14, 1911 ...	Lake Creek	.....do	Troy	202
Oct. 12, 1911	.....do	.....do	.....do	143

GENERAL FEATURES OF THE CLARK FORK OF COLUMBIA RIVER DRAINAGE BASIN.

The Clark Fork of Columbia River rises near Butte, where it is called Silverbow Creek. Along its course it is known at different places as Deer Lodge River, Hellgate River, and Missoula River, until it unites with the Flathead River, near Paradise. Its general course in Montana is northwest. It finally enters the Columbia River in Canada, after having passed through portions of Idaho and Washington. A large part of the drainage area in Montana is of heavily forested mountains and irrigation has been extensively developed in the Bitterroot, Flathead, and other valleys.

The principal tributaries of the Clark Fork are the Big Blackfoot, Bitterroot, and Flathead rivers. The head waters of the Big Blackfoot and Flathead rivers are very densely timbered. There are many valuable power streams, some of which are already being developed.

The mean rainfall reports vary from 11 to 12 inches at Hamilton and Deer Lodge up to nearly 35 inches at Saltese. Owing to the moderate winters, some of the streams in the Clark Fork basin seldom freeze.

The drainage area of the Columbia River tributaries in Montana is estimated at 25,000 square miles.

CLARK FORK OF COLUMBIA, OR MISSOULA RIVER.

Observation Station Located at Missoula, Mont.

Established in 1898.
Elevation of Station about 3,190 feet.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 5,960 square miles.
Character of Drainage Basin: Varies from rough mountains to irrigated valleys.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1898:						
July, 10–31—b	7,300	3,070	4,668	0.78	287,000	0.90
August	2,970	1,740	2,120	.36	130,000	.41
September	1,935	1,680	1,808	.30	108,000	.33
October	2,000	1,805	1,841	.31	113,000	.36
November	1,870	1,620	1,762	.30	105,000	.33
December, 1–4—b	1,680	1,680	1,680	.28	103,000	.32
Total Recorded	.....	.....	.....	...	846,000	...
Monthly Flow for the Year of 1899:						
June	35,800	18,700	25,858	4.34	1,540,000	4.84
July	22,400	4,900	11,208	1.88	689,000	2.17
August	4,900	2,650	3,592	.60	221,000	.69
September	2,725	1,950	2,287	.38	136,000	.42
October	2,500	1,900	2,153	.36	132,000	.42
November	2,240	1,850	2,138	.36	127,000	.40
December, 1–15—b	2,180	1,750	1,946	.33	120,000	.38
Total Recorded	.....	.....	.....	...	2,960,000	...
Monthly Flow for the Year of 1900:						
January, 13–28—b	1,950	730	1,459	.24	89,700	.28
February, 9 days	.....	.....	1,411	.24	25,200	.08
March	6,950	980	2,687	.45	165,000	.52
April	6,450	2,512	4,877	.82	290,000	.92
May	23,600	6,600	12,812	2.15	788,000	2.48

CLARK FORK OF COLUMBIA, OR MISSOULA RIVER—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
June	9,400	3,500	6,361	1.07	378,000	1.19
July	3,300	1,430	2,056	.34	126,000	.39
August	1,430	1,030	1,268	.21	78,000	.24
September	2,347	1,245	1,494	.25	88,900	.28
October	1,690	1,430	1,535	.26	94,400	.30
November, 1–17—b	1,690	1,430	1,560	.26	92,800	.29
December, 5–30—b	1,885	980	1,466	.25	90,100	.29
Total Recorded	.....	.....	.....	...	2,310,000	...
Monthly Flow for the Year of 1901:						
March	.....	.....	2,090	.35	128,000	.40
April, 1–10, 13–30—b	.....	.....	2,601	.44	155,000	.47
May	20,200	7,300	15,156	2.54	932,000	2.93
June	14,450	5,150	7,458	1.25	444,000	1.39
July	4,650	1,690	2,815	.47	173,000	.54
August	1,625	980	1,300	.22	79,900	.25
September	1,625	980	1,415	.24	84,200	.27
October	1,625	1,430	1,472	.25	90,500	.29
November	1,625	1,365	1,478	.25	87,900	.28
December, 1–10	.....	.....	1,413	.24	27,800	.09
Total Recorded	.....	.....	.....	...	2,200,000	...
Monthly Flow for the Year of 1902:						
March	1,900	1,580	1,766	.30	109,000	.35
April	3,050	1,715	2,383	.40	142,000	.45
May	17,350	2,787	10,236	1.72	629,000	1.98
June	15,775	5,212	8,852	1.49	527,000	1.66
July	6,975	2,787	4,725	.79	290,000	.91
August	2,637	1,865	2,136	.36	131,000	.42
September	1,865	1,715	1,778	.30	106,000	.35
October	1,980	1,750	1,808	.30	111,000	.35
November	2,215	1,650	1,875	.31	112,000	.35
December, 14 days	.....	.....	2,236	.38	62,100	.20
Total Recorded	.....	.....	.....	...	2,220,000	...
Monthly Flow for the Year of 1903:						
January—a	.....	.....	1,900	.319	117,000	.37
February—a	.....	.....	1,700	.285	94,400	.30
March	4,440	1,530	2,018	.339	124,000	.39
April	4,550	2,110	2,949	.495	176,000	.56
May	9,840	3,450	5,817	.976	358,000	1.13
June	21,900	6,240	13,950	2,340	830,000	2.61
July	5,800	2,440	3,976	.667	244,000	.77
August	2,440	1,710	1,995	.335	123,000	.39
September—a	.....	.....	1,800	.302	107,000	.34
October—a	.....	.....	1,700	.285	104,000	.33
November—a	.....	.....	1,500	.252	89,300	.28
December—a	.....	.....	1,500	.252	92,200	.29
Total Recorded	.....	.....	3,400	.571	2,460,000	...
Monthly Flow for the Year of 1904:						
January—a	.....	.....	1,300	.218	79,900	.25
February—a	.....	.....	1,300	.218	74,800	.24
March	1,705	1,265	1,443	.242	88,700	.28
April	12,030	1,760	6,701	1,124	399,000	1.25
May	16,650	8,950	11,365	1,907	699,000	2.20
June	12,420	3,910	8,161	1,369	486,000	1.53
July	3,910	1,990	2,790	.468	172,000	.54
August	1,930	1,160	1,478	.248	90,900	.29
September	1,485	1,060	1,181	.198	70,300	.22
October	1,540	915	1,241	.208	76,300	.24
November	1,320	1,210	1,263	.212	75,100	.24
December	1,320	1,010	1,204	.202	74,009	.23
Total Recorded	.....	.....	3,286	.551	2,390,000	...

CLARK FORK OF COLUMBIA, OR MISSOULA RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
March	1,930	1,218	1,427	.239	87,900	.28
April	1,810	1,245	1,442	.242	85,800	.27
May	4,006	1,538	2,497	.419	154,000	.48
June	8,310	3,086	5,429	.911	323,000	1.02
July	4,096	1,385	2,182	.366	134,000	.42
August	1,569	870	1,132	.190	69,600	.22
September	908	748	819	.137	48,700	.15
October	1,290	908	1,069	.179	65,700	.21
November, 1–23	1,200	1,009	1,140	.191	52,000	.16
Total Recorded	.....	.....	.....	....	1,020,000	..
Monthly Flow for the Year of 1906:						
February, 20–28	1,500	810	1,060	.178	18,900	.06
March	3,060	810	1,480	.248	91,000	.29
April	4,460	1,590	2,560	.430	152,000	.48
May	6,490	3,360	4,510	.757	277,000	.87
June	7,490	3,570	5,510	.924	328,000	1.03
July	3,780	1,220	2,060	.346	127,000	.40
August	1,500	915	1,170	.196	71,900	.23
September	1,460	915	1,100	.185	65,500	.21
October	1,440	990	1,150	.193	70,700	.22
November	4,900	1,330	2,360	.396	140,000	.44
December	2,120	1,620	1,920	.322	118,000	.37
Total Recorded	.....	.....	.....	....	1,460,000	...
Monthly Flow for the Year of 1907:						
January—c	.....	.....	770	.129	7,300	.15
February—c	.....	.....	1,700	.285	94,400	.30
March	7,550	1,950	3,010	.505	185,000	.58
April	8,980	4,400	6,540	1.10	389,000	1.23
May	18,400	5,000	10,500	1.76	646,000	2.04
June	17,200	11,200	14,500	2.43	863,000	2.71
Total Recorded	.....	.....	.....	....	2,180,000	....
Mean Monthly Flow for the Period of Record:						
January	.....	.....	1,360	.228	83,600	.26
February	.....	.....	1,570	.264	87,200	.28
March	7,550	810	1,990	.334	122,000	.38
April	12,030	1,240	3,760	.631	224,000	.70
May	23,600	1,540	9,110	1.53	560,000	1.76
June	35,800	3,090	10,700	1.80	637,000	2.01
July	22,400	1,220	4,050	.680	249,000	.78
August	4,900	870	1,800	.302	111,000	.35
September	2,720	748	1,520	.255	90,400	.28
October	2,500	908	1,550	.260	95,300	.30
November	4,900	1,010	1,740	.292	104,000	.33
December	.....	.....	1,620	.272	99,600	.31
Mean Yearly	35,800	748	3,400	.571	2,460,000	7.74

a—Estimated.
b—Mean for part of month taken as mean for whole.
c—Means for January and February, 1907, estimated from gage heights during ice period.
References: U. S. G. S. Annual Reports, 20 part 4, and 21 part 4; Water Supply Papers 28, 38, 39, 51, 52, 66, 75, 85, 100, 135, 178, 214 and 252.

CLARK FORK NEAR ST. REGIS, MONT.

Observation Station Located in Sec. 19, Twp. 18 N., R. 27 W.

Elevation of Station, 2,650 feet.
Drainage Area, 10,700 square miles.
This station has been maintained since October 26, 1910.
The following discharge measurements have been made:

October 26, 1910	3,880	second-feet
July 14, 1911	8,290	second-feet
July 17, 1911	7,160	second-feet
July 25, 1911	5,800	second-feet
August 8, 1911	4,830	second-feet
September 20, 1911	4,160	second-feet
October 5, 1911	4,350	second-feet

Reference: U. S. G. S. Water Supply Paper No. 312.

CLARK FORK.

Observation Station Located in Sec. 1, T. 19 N., R. 26 W., Near Plains, Mont.

Established in 1910.
Elevation of Station, 2,470.
Elevation of Head Waters, 9,000 feet.
Drainage Area, 19,900 square miles.
Character of Drainage Basin: Varies from glacier fed lakes and dense mountain forests to irrigated valleys.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
October, 28–31	9,760	9,400	9,490	0.477	75,300	0.07
November	14,700	9,400	12,400	.623	738,000	.70
December	13,100	9,060	10,500	.528	646,000	.61
Estimated Monthly Flow for the Year of 1911:						
January	8,720	6,970	8,010	.405	493,000	.47
February	6,970	6,020	6,440	.328	358,000	.34
March	10,900	6,470	8,080	.416	497,000	.48
April, 1 to 8	11,700	10,900	11,200	.563	171,000	.17
May, 1 to 6	36,600	28,200	31,900	1.60	379,000	.36
July, 9 to 31	46,600	18,000	30,600	1.54	1,390,000	1.32
August	19,700	9,400	14,400	.724	885,000	.83
September	10,100	8,720	9,570	.481	569,000	.54
October	10,100	8,100	9,520	.478	585,000	.55
November	8,400	6,470	7,770	.390	462,000	.44
December, 1 to 8	8,400	6,240	7,090	.356	112,000	.11
Total Recorded	.....	.....	.....	....	5,900,000	5.61

Note—The above figures for 1911 are to be considered as approximate, and may have to be revised.
Reference: U. S. G. S. Water Supply Papers Nos. 292 and 312.

RACE TRACK CREEK.

Observation Station Located in Sec. 15, T.6 N.,R. 11 W.,Near Aanconda, Mont.

Established in 1911.
Elevation of Head Waters, 8,000 feet.
Drainage Area, 38 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
July, 11 to 31	116	52	77.4	3,220
August	54	34	43.9	2,700
September	34	28	30.9	1,840
October	33	23	27.6	1,700
Total Recorded	..	..	....	9,460

Note—The above discharges are provisional and subsject to revision.
Reference for daily flow in U. S. G. S. Water Supply Paper 312.
Data compiled from U. S. Irrigation Investigation.
Water Rights Decreed on Stream: 5,733 inches of dates from 1865 to 1885 were decreed in 28 decrees.

LITTLE BLACKFOOT RIVER NEAR ELLISTON, MONT.

Observation Station Located in S. W. ¼ Sec. 30, T. 9 N., R 6 W.

Drainage Area, 59 square miles.

This station was established September 29, 1910, and some gage heights were read during the rest of 1910 and 1911.

Two measurements were made as follows:

September 29, 1910—Discharge.....3.9 second-feet
May 11, 1911—Discharge..... .....213 second-feet

References: U. S. G. S. Water Supply Papers 292 and 312.

LITTLE BLACKFOOT DITCH NEAR ELLISTON, MONT.

Observation Station Located in S. W. ¼ Sec. 30, T. 9 N., R. 6 W.

This station was established September 29, 1910, and gage read for a large part of 1911. Only one discharge measurement was made, being 7.6 second-feet on September 29, 1910.

References: U. S. G. S. Water Supply Papers 292 and 312.

ROCK CREEK NEAR QUIGLEY, MONT.

Drainage Area, 700 square males.

This station, which is three miles south of Quigley, was established September 22, 1910. Some gage heights have been read during the remaining months of 1910 and during 1911.

The following discharge measurements have been made:

September 22, 1910 ..... 295 second-feet
January 4, 1911 ..... 188 second-feet
February 21, 1911 ..... 171 second-feet
May 31, 1911 .....1,460 second-feet
June 28, 1911 .....1,500 second-feet

References: U. S. G. S. Water Supply Papers 292 and 312.

BIG BLACKFOOT RIVER.

Observation Station Located in T. 13 N., R. 18 W., at Bonner, Mont.

Established in 1898.
Elevation of Station, 3,300 feet.
Elevation of Head Waters, 8,000 feet.
Rainfall observed at Ovando, Mont.
Drainage Area, 2,460 square miles.
Character of Drainage Basin: Forested mountains.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1898:						
July, 7-31—b	5,520	1,550	2,797	1.13	172,000	1.30
August	1,613	975	1,190	.48	73,200	.55
September	1,030	887	962	.39	57,200	.44
October	1,185	837	968	.39	59,500	.45
November	1,090	850	897	.36	53,400	.40
December, 1-10—b	1,185	850	939	.38	57,700	.44
Total Recorded	.....	...	...	...	473,000	...
Monthly Flow for the Year of 1899:						
March, 3-31—b	1,390	730	831	.34	51,100	.39
April	7,416	740	2,516	1.02	150,000	1.14
May	14,598	2,112	7,699	3.12	473,000	3.60
June	17,244	10,818	13,615	5.52	810,000	6.16
July	12,078	2,810	6,557	2.66	403,000	3.07
August	2,810	1,420	1,921	.78	118,000	.90
September	1,460	1,050	1,250	.51	74,400	.57
October	1,205	965	1,073	.44	66,000	.51
November	1,275	990	1,074	.44	63,900	.49
December	1,420	865	1,012	.41	62,200	.47
Total Recorded	17,244	...	.....	...	2,270,000	17.30
Monthly Flow for the Year of 1900:						
January	945	662	787	.32	48,400	.37
February	743	460	634	.26	35,200	.27
March	3,125	380	1,278	.52	78,600	.60
April	3,749	1,310	2,707	1.10	161,000	1.23
May	12,559	3,514	6,566	2.66	404,000	3.07
June	4,074	1,880	3,116	1.26	185,000	1.41
July	1,830	1,026	1,349	.55	83,000	.63
August	1,067	864	944	.38	58,000	.44
September	986	743	859	.35	51,100	.39
October	945	662	773	.31	47,500	.36
November, 1-19—b	824	662	760	.31	45,200	.35
December, 6-31—b	1,067	581	749	.30	46,000	.35
Total Recorded	12,559	380	1,710	.69	1,250,000	9.47
Monthly Flow for the Year of 1901:						
January	1,060	550	673	.27	41,400	.31
February	1,310	450	580	.24	32,200	.25
March	3,988	550	1,017	.41	62,500	.47
April	2,950	585	1,186	.48	70,600	.54
May	12,302	3,899	8,552	3.47	526,000	4.00
June	7,676	2,650	3,698	1.50	220,000	1.67
Total Recorded	.....	.....	.....	....	953,000	....
Monthly Flow for the Year of 1903:						
May, 15-31	6,060	2,730	4,334	1.758	146,000	1.11
June—a	.....	.....	7,575	3.073	451,000	3.43
July	3,220	1,425	2,191	.889	135,000	1.02
August	1,470	920	1,105	.448	67,900	.52
September	1,070	780	889	.361	52,900	.40
October	1,180	890	1,011	.410	62,200	.47
November	1,040	830	920	.373	54,700	.42
December	1,470	805	920	.373	56,600	.43
Total Recorded	.....	...	...	....	1,026,000	7.80

BIG BLACKFOOT—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1904:						
January	810	605	666	.270	41,000	.31
February	635	525	574	.233	33,000	.25
March	1,020	525	668	.271	41,100	.31
April	7,500	705	3,785	1,535	225,000	1.71
May	8,820	4,250	6,066	2.461	373,000	2.84
June	6,540	2,330	4,217	1.711	251,000	1.91
July	2,395	1,140	1,638	.664	101,000	.77
August	1,140	740	898	.364	55,200	.42
September	810	550	684	.277	40,700	.31
October	1,260	440	581	.236	35,700	.27
November	550	440	509	.206	30,300	.23
December	610	420	472	.191	29,000	.22
Total Recorded	8,820	420	1,730	.702	1,260,000	9.55
Monthly Flow for the Year of 1905:						
January, 1–11, 27–31	1,120	365	572	.232	18,200	.14
March	940	320	459	.186	28,200	.21
April	735	365	463	.188	27,600	.21
May	2,420	700	1,294	.525	79,600	.60
June	4,360	1,760	2,936	1.19	175,000	1.33
July	1,760	770	1,079	.437	66,400	.50
August	735	440	565	.229	34,700	.26
September	500	340	407	.165	24,200	.18
October	560	365	465	.189	28,600	.22
Total Recorded	...	...	...	....	482,000	3.65
Mean Monthly Flow for the Period of Record:						
January	1,120	365	709	.288	43,600	.33
February	1,310	450	596	.242	33,100	.25
March	3,988	320	851	.346	52,300	.40
April	7,500	365	2,130	.866	127,000	.97
May	14,598	700	5,900	2.40	363,000	2.77
June	17,244	1,760	5,860	2.38	349,000	2.66
July	12,078	770	2,600	1.06	160,000	1.22
August	2,810	440	1,100	.447	67,600	.52
September	1,460	340	842	.342	50,100	.38
October	1,260	365	812	.330	49,900	.38
November	1,275	440	832	.338	49.500	.38
December	1,470	420	818	.332	50,300	.38
Mean Yearly	17,244	320	1,920	.781	1,400,000	10.64

a—June 21–27, 1903, estimated.

b—Mean for part of month taken as mean for the whole.

Note—No record is published for 1902 except a measurement of 4.01 sec.-ft. on November 28, which is probably a misprint for 401. sec.-ft.

Reference for daily flow in U. S. G. S. Annual Reports, 20 part 4, 21 part 4, and 22 part 4; Water Supply Papers Nos. 28, 38, 39, 51, 66, 75, 85, 100, 135, 178.

Rainfall at Ovando: Maximum, 22.65 inches in 1900. Minimum, 11.20 inches in 1904. Mean, 18.36 inches for 10¼ years, June, 1889, to October, 1909, inclusive.

RATTLESNAKE CREEK.

Observation Station Located at Missoula, Mont.

Established in 1899.
Elevation of Station, 3,200 feet.
Elevation of Head Waters, about 7,000 feet.
Drainage Area, 53 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1899:				
May, 27–31	.....	...	846	.....
June	2,047	490	1,197	71,200
July	1,200	94	511	31,400
August	87	52	63	3,870
September	72	46	57	3,390
October	80	44	70	4,300
November	94	52	64	3,810
December	94	36	74	4,550
Total Recorded	..	..	..	123,000

Gage heights are published for 1900, but there were not sufficient discharge measurements to make a good rating curve.

The following measurements have been made since 1899:

May 19, 1900 .....704 second-feet
June 18, 1900 .....645 second-feet
April 27, 1903 .....274 second-feet
May 19, 1904 .....646 second-feet

Reference for daily flow in U. S. G. S. Annual Report 21, part 4, and Water Supply Papers 38, 39, 51, 100 and 135.

Data Compiled from U. S. Irrigation Investigation.

Water Rights Decreed on Stream: 25 decrees, 4,087 inches (decreed in 1903). 1903).

BITTERROOT RIVER.

Observation Station Located in T. 5 N., R. 21 W., Two Miles Southwest of Grantsdale, Montana.

Established in 1902.
Elevation of Station, 3,600 feet.
Drainage Area, 1,550 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
April 25–20	.....	.....	1,085	0.70	12,900	0.16
May	11,075	900	4,823	3.11	297,000	3.59
June	9,285	3,050	5,176	3.34	308,000	3.73
July	3,700	900	2,143	1.38	132,000	1.59
August	790	205	428	.28	26,300	.32
September	205	135	167	.11	9,940	.12
October	280	205	242	.16	14,900	.18
November	615	280	353	.23	21,000	.26
December	1,150	340	472	.30	29,000	.35
Total Recorded	.....	.....	.....	.....	851,000	10.30
Monthly Flow for the Year of 1903:						
January	700	395	518	.334	31,800	.38
February	530	395	471	.304	26,200	.32
March	1,150	340	519	.335	31,900	.39
April	3,050	615	1,409	.909	83,800	1.01
May	6,150	1,745	3,031	1.955	186,000	2.26
June	12,875	4,575	7,968	5.141	474,000	5.74
July	3,700	700	1,912	1.234	118,000	1.42
August	700	175	334	.215	20,500	.25
September	1,150	150	481	.310	28,600	.35

BITTERROOT RIVER—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
October	1,585	460	825	.532	50,700	.62
November	790	530	615	.397	36,600	.44
December	1,020	530	650	.419	40,000	.48
Total Recorded	12,875	150	1,561	1.007	1,130,000	13.96
Monthly Flow for the Year of 1904:						
January	450	225	296	.191	18,200	.22
February	540	225	323	.208	18,600	.22
March	930	290	490	.316	30,100	.36
April	5,230	540	2,783	1.795	166,000	2.00
May	11,825	3,620	5,868	3.786	361,000	4.36
June	7,425	3,060	5,208	3.360	310,000	3.75
July	3,335	770	1,899	1.225	117,000	1.41
August	675	88	246	.159	15,100	.18
September	115	65	74	.048	4,400	.05
October	170	55	118	.076	7,260	.09
November	225	130	179	.115	10,600	.13
December	225	170	181	.117	11,100	.14
Total Recorded	11,825	55	1,472	.950	1,070,000	12.91
Monthly Flow for the Year of 1905:						
January, 19–31	392	360	385	.248	9,930	.12
February, 19–28	428	360	394	.254	7,820	.09
March	592	360	485	.313	29,800	.36
April	2,105	360	915	.590	54,400	.66
May	3,215	920	1,544	.996	94,900	1.15
June	5,235	1,825	3,276	2.11	195,000	2.35
July	2,435	395	1,111	.717	68,300	.83
August	395	50	168	.108	10,300	.12
September	145	5	44	.029	2,640	.03
October	325	145	247	.159	15,200	.18
November	395	200	264	.170	15,700	.19
December, 1–5	260	260	260	.168	2,580	.03
Total Recorded	.....	.....	.....	.....	507,000	6.11
Monthly Flow for the Year of 1906:						
January	470	200	359	.232	22,100	.27
February, 1–8	325	200	246	.159	3,900	.05
March, 22–31	725	325	522	.337	10,400	.13
April	3,550	510	1,370	.884	81,500	.99
May	4,110	1,825	2,800	1.81	172,000	2.09
June	4,110	1,570	2,540	1.64	151,000	1.83
July	1,700	110	866	.559	53,200	.64
August	260	60	127	.082	7,810	.09
September	260	80	157	.101	9,340	.11
October	1,450	150	386	.249	23,700	.29
November	8,100	470	1,650	1.06	98,200	1.18
December	1,020	592	750	.484	46,100	.56
Total Recorded	.....	.....	.....	.....	679,000	.....
Monthly Flow for the Year of 1907:						
January, 1–13—a	685	430	541	.349	33,300	.40
February, 12–28—a	932	685	793	.512	44,000	.53
March	1,210	430	694	.448	42,700	.52
April	3,840	880	2,010	1.30	120,000	1.45
May	9,430	1,730	5,610	3.62	345,000	4.17
June	11,800	4,380	7,250	4.68	431,000	5.22
July	7,390	1,800	4,040	2.61	248,000	3.01
August	1,730	315	803	.518	49,400	.60
September	830	350	583	.376	34,700	.42
October	430	280	367	.237	22,600	.27
November	390	280	351	.226	20,900	.25
December	470	280	351	.226	21,600	.26
Total Recorded	11,800	280	1,950	1.26	1,410,000	17.10
Mean Monthly Flow for the Period of Record:						
January	700	200	428	.276	26,300	.32
February	932	200	529	.342	29,400	.36
March	1,210	290	547	.353	33,600	.41
April	5,230	360	1,700	1.10	101,000	1.23

BITTERROOT RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
May	11,800	900	3,950	2.55	243,000	2.94
June	12,900	1,570	5,240	3.38	312,000	3.77
July	7,390	110	2,000	1.29	123,000	1.49
August	1,730	50	351	.226	21,600	.26
September	1,150	5	251	.162	14,900	.18
October	1,580	55	364	.235	22,400	.27
November	8,100	130	569	.368	33,900	.41
December	1,150	170	481	.310	29,600	.36
Mean Yearly	12,900	5	1,370	.883	991,000	12.00

a—Mean for a part of month taken as the mean for the whole.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 85, 100, 135, 178, 214, and 252.

BITTERROOT RIVER.

Observation Station Located 7 Miles Southwest of Missoula, Mont.

Established in 1898.

Drainage Area, 3,260 square miles.

Character of Drainage Basin: The stream drains a wide irrigated valley and is fed by many small mountain streams.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1898:						
July ,6-31—b	7,930	2,000	4,148	1.27	255,000	1.46
August	1,930	950	1,201	.37	73,800	.43
September	1,190	875	1,021	.31	60,800	.35
October	1,325	1,025	1,149	.35	70,600	.40
November	1,278	1,075	1,154	.35	68,700	.39
December, 1-10—b	1,730	1,000	1,137	.35	69,900	.40
Total Recorded	.....	.....	.....	.....	599,000	3.43
Monthly Flow for the Year of 1899:						
January—a	.....	.....	1,200	.37	73,800	.43
February—a	.....	.....	1,000	.31	55,500	.32
March	1,255	930	1,070	.33	65,800	.38
April	4,230	1,122	2,842	.87	169,000	.97
May	15,800	2,680	7,729	2.37	475,000	2.73
June	37,437	11,400	21,876	6.71	1,300,000	7.49
July	23,600	5,440	14,497	4.45	891,000	5.13
August	5,330	1,985	3,411	1.05	210,000	1.21
September	2,160	1,122	1,622	.50	96,500	.56
October	2,160	1,122	1,470	.45	90,400	.52
November	1,830	1,165	1,477	.45	87,900	.50
December	1,540	1,165	1,351	.41	83,100	.47
Total Recorded	37,437	.....	4,960	1.52	3,600,000	20.71
Monthly Flow for the Year of 1900:						
January	1,540	1,080	1,221	.37	75,100	.43
February, 1-10	.....	.....	1,084	.33	21,500	.12
March, 4-31—b	2,280	910	1,652	.51	102,000	.59
April	4,600	1,930	3,626	1.11	216,000	1.24
May	18,150	6,400	9,871	3.03	607,000	3.49
June	10,650	4,060	7,352	2.26	438,000	2.52

BITTERROOT RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
July	3,570	980	1,820	.56	112,000	.65
August	1,010	800	869	.27	53,400	.31
September	1,350	950	1,137	.35	67,700	.39
October	8,250	1,010	2,838	.87	174,000	1.00
November, 24 days—b	1,930	1,122	1,373	.42	81,700	.47
December	1,350	950	1,148	.35	70,600	.40
Total Recorded	18,150	.....	.....	.....	2,020,000	11.61
Monthly Flow for the Year of 1901:						
January—b	.....	.....	1,360	.42	83,600	.49
February—b	.....	.....	1,401	.43	77,800	.45
March	2,750	1,390	1,691	.52	104,000	.60
April—b	.....	.....	1,866	.57	81,400	.51
May	18,375	7,210	11,025	3.38	678,000	3.90
June	11,700	3,050	5,020	1.54	299,000	1.72
July	3,650	1,225	2,667	.82	164,000	.95
August	1,200	940	995	.31	61,200	.36
September	1,320	940	1,130	.35	67,500	.39
October	1,250	1,080	1,157	.36	71,100	.42
November	1,175	1,100	1,149	.35	68,400	.39
Total Recorded	18,375	.....	.....	.....	1,760,000	10.18
Monthly Flow for the Year of 1903:						
June	18,000	7,300	12,170	3.73	724,000	4.16
July	7,000	2,800	4,280	1.31	263,000	1.51
Monthly Flow for the Year of 1904:						
January	1,075	685	799	.245	49,100	.28
February	1,525	545	788	.242	45,300	.26
March	3,060	830	1,434	.440	88,200	.51
April	9,140	1,435	4,592	1.409	273,000	1.57
May	18,320	5,140	9,031	2,770	555,000	3.19
June, 13 days	11,520	4,940	8,397	2.576	216,000	1.24
July	6,050	1,870	3,469	1.064	213,000	1.23
August—11 days	1,770	545	1,190	.365	26,000	.15
September	615	370	455	.140	27,100	.16
October	685	405	568	.174	35,000	.20
November	685	580	614	.188	36,500	.21
December	650	440	530	.163	32,600	.19
Total Recorded	.....	.....	.....	.....	1,600,000	9.19
Mean Monthly Flow for the Period of Record:						
January	1,540	685	1,140	.352	70,100	.41
February	.....	.....	1,060	.326	58,900	.34
March	3,060	830	1,460	.449	89,800	.52
April	9,140	1,120	3,230	.991	192,000	1.11
May	18,400	2,680	9,410	2.89	579,000	3.33
June	37,400	3,050	11,600	3.56	690,000	3.97
July	23,600	980	5,150	1.58	317,000	1.82
August	5,330	545	1,620	.497	99,600	.57
September	2,160	370	1,070	.329	63,700	.37
October	8,250	405	1,430	.440	87,900	.51
November	1,930	580	1,150	.354	68,400	.40
December	1,730	440	1,040	.320	64,000	.37
Mean Yearly	37,400	370	3,280	1.01	2,380,000	13.72

a—Approximate.
b—Mean discharge for part of month taken as mean for the whole.
Note—The station was discontinued during 1902.
Reference for daily flow in U. S. G. S. Annual Reports 20 part 4, 21 part 4, 22 part 4; Water Supply papers Nos. 28, 38, 39, 51, 52, 66, 75, 100, 135.

WEST FORK OF BITTERROOT RIVER.

Observation Station Located in Sec. 27, T. 2 N., R. 21 W., Near Darby, Mont.

Established in 1910.
Drainage Area, 572 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
September, 19 to 30	177	140	160	.280	3,810	.12
October	335	140	236	.413	14,500	.48
November	580	170	372	.650	22,100	.73
December	330	191	261	.456	16,000	.53
Total Recorded	.....	.....	.....	.....	56,400	.....
Monthly Flow for the Year of 1911:						
January, 10th, (1 day)	.....	.....	127	.....	.....	.....
March, 20 to 31	705	408	557	.974	13,200	.43
April	1,750	462	808	1.41	48,100	1.57
May	2,830	1,180	1,760	3.08	108,000	3.55
June	4,000	1,330	2,750	4.81	164,000	5.37
July	1,580	295	683	1.19	42,000	1.37
August	355	176	231	.404	14,200	.47
September	205	170	177	.309	10,500	.34
October	245	170	191	.334	11,700	.39
Total Recorded	.....	.....	.....	.....	412,000	13.49

Reference for daily flow in U. S. G. S. Water Supply papers 292 and 312.

EAST FORK OF BITTERROOT RIVER.

Observation Station Located in S. E. ¼ Sec. 21, T. 2 N., R. 20 W., Near Darby, Mont.

Drainage Area, 340 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
September, 20 to 30	104	84	93.5	.275	2,040	.12
October	166	84	104	.306	6,400	.35
November	166	66	111	.326	6,600	.36
December	145	50	108	.318	6,640	.37
Total Recorded	.....	.....	.....	.....	21,700	.....

Some gage heights were read during 1911, and the following measurements of discharge were made:

Jan. 12, 1911	Discharge	74	second-feet.
Apr. 18, 1911	Discharge	152	second-feet.
June 16, 1911	Discharge	1,720	second-feet.
July 19, 1911	Discharge	253	second-feet.
Sept. 19, 1911	Discharge	107	second-feet.

Reference for daily flow in U. S. G. S. Water Supply papers 292 and 312.

LOLO CREEK NEAR LOLO, MONTANA.

This station, which is seven miles above Lolo, in Sec. 34, Twp. 12 N., R. 21 W., was established October 18, 1910, to determine the amount of water available for power and irrigation. Several ditches divert water below the station, and a small amount is taken out above. The drainage area is about 250 square miles, nearly all in the mountains and national forest. Gage heights are available from May to December, 1911, but the location of the gage was changed in May, 1911, and this new section has not been completely rated.

The following measurements were made:

Oct. 18, 1910 .....Discharge 90 second-feet.
Dec. 30, 1910 .....Discharge 74 second-feet.
July 5, 1911 .....Discharge 414 second-feet.
Sept. 8, 1911 .....Discharge 92 second-feet.

References: U. S. G. S. Water Supply Papers 292 and 312.

ST. REGIS CREEK.

Observation Station Located in N. E. ¼ Sec. 28 T. 18 N., R. 28 W., Near St. Regis, Mont.

Established in 1910.
Drainage Area, 278 square miles.
Character of Drainage Basin: Mountainous and forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
September	145	120	a127	7,560
October	485	130	210	12,900
November	1,000	92	443	26,400
December	350	100	201	12,400
Total Recorded	...	...	...	59,300
Monthly Flow for the Year of 1911:				
March	1,670	180	710	43,700
April	2,850	790	1,520	90,400
May	2,850	1,320	1,750	108,000
June	2,230	660	1,290	76,800
July	660	225	379	23,300
August	258	142	197	12,100
September	180	142	160	9,520
October	155	118	138	8,480
November	...	...	b130	7,740
Total Recorded	...	...	....	380,000

a—Estimated September 1 to 16, 1910.
b—Estimated November 9 to 30, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 292 and 312.

FLATHEAD RIVER.

Observation Station Located in T. 31 N., R. 19 W., 10 Miles North of Columbia Falls, Mont.

Established in 1910.

Drainage Area, 1,620 square miles.
Character of Drainage Basin: A mountainous, densely forested valley; river is fed by glaciers and mountain streams.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
September, 22-30	1,030	925	974	0.601	17,000	0.10
October	3,890	1,300	2,220	1.37	136,000	1.58
November	5,400	1,400	2,310	1.43	137,000	1.60
December	1,510	950	1,120	.692	68,900	.80
Total Recorded	.....	.....	.....	....	359,000	....

FLATHEAD RIVER—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1911:						
January	1,450	510	1,050	0.648	64,600	0.75
February	1,100	710	917	.566	50,900	.59
March	1,560	640	983	.607	60,400	.70
April	7,650	1,290	3,080	1.90	183,000	2.12
May	9,600	4,710	6,960	4.30	428,000	4.96
June	13,100	7,920	10,800	6.67	643,000	7.44
July	7,920	2,330	4,290	2.65	264,000	3.06
August	2,480	1,240	1,870	1.15	115,000	1.33
September	1,910	1,240	1,550	.957	92,200	1.07
October	1,340	710	1,020	.630	62,700	.73
November	1,050	350	764	.472	45,500	.53
December	1,140	510	774	.478	47,600	.55
Total Recorded	13,100	350	2,840	1.75	2,060,000	23.83

Reference for daily flow in U. S. G. S. Water Supply Papers 292 and 312.

FLATHEAD RIVER.

Observation Station Located in T. 22 N., R. 21 W., Eight Miles Below Polson, Mont.

Established in 1907.

Drainage Area, 6,770 square miles.

Character of Drainage Basin: Mountainous above Columbia Falls, below which the valley is broad and fertile.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1907:						
July, 23-31	26,600	21,800	24,300	3.59	434,000	1.20
August	20,700	9,330	13,900	2.05	855,000	2.36
September	9,330	7,090	8,290	1.22	493,000	1.36
October	6,850	4,160	5,520	.816	339,000	.94
November	4,160	3,130	3,620	.538	215,000	.60
December—a	3,130	2,810	3,000	.443	184,000	.51
Total Recorded	.....	.....	.....	....	2,520,000	6.97
Monthly Flow for the Year of 1908:						
January—a	2,810	2,360	2,450	.362	156,000	.42
February	2,440	2,280	2,420	.358	139,000	.39
March	2,910	2,280	2,460	.363	151,000	.42
April	18,400	2,530	7,040	1.04	419,000	1.16
May	33,600	18,700	29,000	4.28	1,780,000	4.93
June	62,100	32,700	48,800	7.21	2,900,000	8.04
July	33,600	14,500	27,100	4.00	1,670,000	4.61
August	14,900	5,230	9,570	1.41	588,000	1.63
September	5,750	4,300	4,940	.730	294,000	.81
October	4,450	3,880	4,090	.604	251,000	.70
November	4,160	4,020	4,060	.600	242,000	.67
December	4,020	3,130	3,480	.514	214,000	.59
Total Recorded	62,100	2,280	12,100	1.79	8,800,000	24.37
Monthly Flow for the Year of 1909:						
January	3,490	3,130	3,270	.483	201,000	.56
February	3,130	2,620	2,810	.415	156,000	.43
March	2,620	2,530	2,550	.377	157,000	.43

FLATHEAD RIVER—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
April	3,880	2,530	2,780	.411	165,000	.46
May	30,400	3,880	11,000	1.62	676,000	1.87
June	58,800	31,100	50,800	7.50	3,020,000	8.37
July	47,600	18,800	31,600	4.67	1,940,000	5.38
August	18,200	7,030	12,100	1.79	744,000	2.06
September	6,800	5,060	5,840	.862	348,000	.96
October	4,880	3,700	4,320	.638	266,000	.74
November	9,700	3,770	6,320	.934	376,000	1.04
December	10,500	6,250	8,330	1.23	512,000	1.42
Total Recorded	58,800	2,530	11,800	1.74	8,560,000	23.72
Monthly Flow for the Year of 1910:						
January	7,100	4,120	5,080	.751	312,000	.87
February	4,120	3,820	4,030	.596	224,000	.62
March	9,630	3,820	5,290	.781	325,000	.90
April	34,700	9,800	17,200	2.54	1,020,000	2.83
May	42,800	33,800	38,000	5.61	2,340,000	6.47
June	38,900	23,000	31,100	4.59	1,850,000	5.12
July	22,000	9,000	15,200	2.25	935,000	2.59
August	8,740	4,640	6,410	.946	394,000	1.09
September	4,720	3,640	4,270	.631	254,000	.70
October	5,900	3,720	5,010	.740	308,000	.85
November	9,470	5,900	7,860	1.16	468,000	1.29
December	9,000	5,280	7,180	1.06	441,000	1.22
Total Recorded	42,800	3,640	12,300	1.82	8,870,000	24.55
Mean Monthly Flow for the Period of Record:						
January	7,100	2,360	3,600	.532	221,000	.61
February	4,120	2,280	3,090	.457	172,000	.48
March	9,630	2,280	3,430	.507	211,000	.58
April	34,700	2,530	9,070	1.34	540,000	1.50
May	42,800	3,880	26,000	3.84	1,600,000	4.43
June	62,100	23,000	43,600	6.44	2,590,000	7.18
July	47,600	9,000	24,600	3.63	1,510,000	4.18
August	20,700	4,640	10,500	1.55	646,000	1.79
September	9,330	3,640	5,840	.863	348,000	.96
October	6,850	3,700	4,740	.700	291,000	.81
November	9,700	3,130	5,460	.807	325,000	.90
December	10,500	2,810	5,500	.812	338,000	.94
Mean Yearly	62,100	2,280	12,100	1.79	8,790,000	24.36

a—Discharges interpolated December 19, 1907, to January 22, 1908.

Note—There was some doubt regarding part of the gage heights for 1911, so the data for that year has not yet been computed. The following measurements were made during 1911: Jan. 13, 3,990 sec.-ft.; Mar. 25, 3,230 sec.-ft.; and July 6, 34,500 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers 252, 272, 292 and 312.

MIDDLE FORK OF FLATHEAD RIVER.

Observation Station Located in Sec. 35, T. 32 N., R. 19 W., at Belton, Mont.
Established in 1910.
Elevation of Station, 3,200 feet.
Elevation of Head Waters, 8,500 feet.
Drainage Area, 900 square miles.
Character of Drainage Basin: Densely forested mountains.

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
October, 15 to 31	3,270	960	1,570	1.74	5,290	1.10
November	3,700	1,110	1,960	2.18	11,700	2.43
December	1,200	560	808	.898	49,700	1.04
Total Recorded	.....	.....	.....	....	66,700	....
Monthly Flow for the Year of 1911:						
January	620	340	538	.598	33,100	.69
February	570	440	505	.561	28,000	.58
March	2,100	400	891	.990	54,800	1.14
April	8,210	1,100	3,020	3.36	180,000	3.75
May	11,900	4,550	7,030	7.81	432,000	9.00
June	12,600	5,470	8,390	9.32	499,000	10.40
July	5,090	1,400	2,760	3.07	170,000	3.54
August	1,400	1,020	1,140	1.27	70,100	1.46
September	1,400	960	1,120	1.24	66,600	1.38
October	1,240	900	1,140	1.27	70,100	1.46
November	900	670	759	.843	45,200	.94
December	620	400	431	.479	26,500	.55
Total Recorded	12,600	340	2,320	2.58	1,680,000	34.89

Reference for daily flow in U. S. G. S. Water Supply Papers 292 and 312.

SOUTH FORK OF FLATHEAD RIVER NEAR COLUMBIA FALLS, MONT.

Drainage Area, 1,640 square miles.

This station, which was established September 20, 1910, is in the N. W. ¼ S. W. ¼ Sec. 4, Twp. 30 N., R. 19 W. The drainage area is mountainous, and lies in the Flathead National Forest. The station itself is unsatisfactory on account of back water from the main river during high stages. Gage heights were read occasionally during 1911.

The following measurements of discharge have been made:

Sept. 25, 1906	Discharge	649	second-feet.
Sept. 20, 1910	Discharge	597	second-feet.
Oct. 14, 1910	Discharge	1,460	second-feet.
Nov. 27, 1910	Discharge	2,500	second-feet.
Jan. 4, 1911	Discharge	820	second-feet.
May 19, 1911	Discharge	12,300	second-feet.
June 30, 1911	Discharge	9,670	second-feet.
Aug. 10, 1911	Discharge	1,750	second-feet.
Sept. 20, 1911	Discharge	920	second-feet.

References: U. S. G. S. Water Supply Papers 214, 292 and 312.

STILLWATER RIVER.

Observation Station Located in Sec. 31, T. 29 N., R. 21 W., Near Kalispell, Mont.

Established in 1906.

Drainage Area, 453 square miles.

Character of Drainage Basin: Mountains and valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
September, 25–30	500	140	274	3,260
October	382	72	178	10,900
November	1,380	95	410	24,400
December	658	136	327	20,100
Total Recorded	...	...	...	58,660

Gage heights are published to May 30, 1907, but there were no measurements made that year.

Reference for daily flow in U. S. G. S. Water Supply Papers 214 and 252.

WHITEFISH RIVER NEAR COLUMBIA FALLS, MONT.

A station was established about six miles from Columbia Falls in September, 1906, but gage heights were recorded for only one month.

The following measurements were made in 1906:

Sept. 24 ..... 126 second-feet.
Oct. 22 ..... 14.8 second-feet.
Nov. 22 ..... 15.9 second-feet.

Reference: U. S. G. S. Water Supply Paper No. 214.

SWAN RIVER NEAR BIGFORK, MONT.

This station, which is in Sec. 27, Twp. 25 N., R. 18 W., two miles from the mouth of the river, was established October 10, 1910. Gage heights were affected by ice and back water from the lake, and it was abandoned because the observer could not reach the gage during high water. Its drainage area of 653 square miles lies almost wholly within the Flathead National Forest.

The following measurement was made:

Oct. 10, 1910 ..... Discharge 557 second-feet.

Reference: U. S. G. S. Water Supply Paper 292.

LITTLE BITTERROOT RIVER.

Observation Station Located in T. 27 N., R. 24 W., Near Marion, Mont.

Established in 1910.

Drainage Area, 52 square miles.

Character of Drainage Basin: Mountainous and forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
January	..	..	a4.00	246
February	..	..	a4.00	222
March	..	..	a28.0	1,720
April	36	..	a28.4	1,690
May	43	3.5	22.0	1,350
June	35	16	26.0	1,550
July	31	11	20.0	1,230
August	11	1.2	3.7	228
September	17	1.1	8.3	494
October	10.2	2.6	6.4	394

LITTLE BITTERROOT RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
November	5.0	2.0	3.3	196
December	4.0	1.6	2.8	172
Total Recorded	43	1.1	13.1	9,490
Monthly Flow for the Year of 1911:				
May	18.0	8.7	15.2	935
June	19	14	16.1	958
July	18	3.7	10.6	652
August	5.0	2.4	3.43	211
September	3.3	2.4	2.60	155
October	2.6	2.6	2.60	160
November	2.6	2.6	2.60	155
December	3.3	2.4	3.14	193
Total Recorded	...	...	....	3,420

a—Estimated January 1 to April 14, 1910.
Reference for daily flow in U. S. G. S. Water Supply Papers 292 and 312.

LITTLE BITTERROOT RIVER.

Observation Station Located in T. 25 N., R. 24 W., Near Hubbart, Mont.

Established in 1909.
Drainage Area, 194 square miles.
Character of Drainage Basin: Mountainous and forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 22-30	66	48	57	1,020
May, 1-22	122	58	89	3,880
August	40	13	22	1,350
September	13	13	13	774
October	13	13	13	799
November	56	13	24	1,430
Total Recorded	..	..	..	9,250
Monthly Flow for the Year of 1910:				
January	...	...	a18	1,110
February	...	...	a18	1,000
March	206	...	133	8,180
April	176	76	133	7,910
May	119	52	80	4,920
June	70	32	47	2,800
July	44	18	29	1,780
August	17	10	12	740
September	19	10	13	774
October	19	16	16	984
November	19	16	17	1,010
December	..	..	a16	984
Total Recorded	206	10	44.3	32,200
Monthly Flow for the Year of 1911:				
April	72	25	42.8	2,550
May	80	54	65.1	4,000
June	80	32	50.0	2,980
July	51	14	28.3	1,740
August	34	12	17.4	1,070
September	22	8	10.5	625
October	8	6.5	6.72	413
Total Recorded	..	..	..	13,400

a—Estimated.
Reference for daily flow in U. S. G. S. Water Supply Papers 272, 292 and 312.

LITTLE BITTERROOT RIVER.

Observation Station Located in T. 24 N., R. 24 W., Near Dayton, Mont.

Established in 1908.
Drainage Area, 258 square miles.
Character of Drainage Basin: Mountainous and forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April, 18-30	262	101	177	4,550
May	158	97	134	8,240
June	344	82	124	7,380
July	80	46	61.3	3,770
August	44	21	29.5	1,810
September	31	13	19.3	1,150
October	36	19	23.3	1,430
Total Recorded	..	..	....	28,300
Monthly Flow for the Year of 1909:				
March, 19-31	47	28	39.6	1,020
April	102	42	65.8	3,920
May	258	79	143	8,790
June	190	59	129	7,680
July	72	26	44.1	2,710
August	42	20	26.3	1,620
September	24	18	21.0	1,250
October	21	20	20.4	1,250
November	110	21	37.2	2,210
Total Recorded	..	..	....	30,400

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 252 and 272.

CROW CREEK.

Observation Station Located in T. 20 N., R. 20 W., Four Miles South of Ronan, Mont.

Established in 1906.
Drainage Area, 52 square miles.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
September, 21-30	27	22	23.9	474
October	42	22	29.9	1,840
November	156	27	51.5	3,060
December	59	27	34.2	2,100
Total Recorded	.....	.....	.....	7,470
Monthly Flow for the Year of 1907:				
January—a	.....	.....	25.0	1,540
February—a	.....	.....	20.0	1,110
March	119	25	39.8	2,450
April	61	30	43.7	2,600
May	386	33	148	9,100
June	427	244	306	18,200
July	392	93	196	12,100
August	89	44	62.8	3,860
September	59	33	41.1	2,450
October	34	24	27.5	1,690
November	24	20	21.2	1,260
December	21	18	20.0	1,230
Total Recorded	.....	.....	79.3	57,600
Monthly Flow for the Year of 1908:				
March	27	18	21.5	1,320
April	150	18	57.0	3,390
May	314	54	179	11,000
June—b	1,400	151	536	31,900

CROW CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
July	250	55	109	6,700
August	52	32	37.5	2,310
September	271	22	42.0	2,500
October	59	23	34.0	2,090
November	39	20	24.2	1,440
Total Recorded	.....	.....	.....	62,600
Monthly Flow for the Year of 1909:				
May	264	28	76.7	4,720
June	426	162	274	16,300
July	232	38	133	8,180
August	38	24	30.9	1,900
September	34	22	25.8	1,540
October	32	18	21.6	1,330
November	158	18	53.4	3,180
Total Recorded	.....	.....	.....	37,200
Monthly Flow for the Year of 1910:				
January—a	.....	.....	25	1,540
February—a	.....	.....	25	1,390
March	112	28	46.8	2,880
April	228	35	105	6,250
May	300	106	197	12,100
June	170	76	127	7,560
July	56	23	33.4	2,050
August	25	22	22.9	1,410
September	25	14	20.0	1,190
October	37	20	23.9	1,470
November	43	25	31.8	1,890
December	31	17	23.7	1,460
Total Recorded	300	14	57.1	41,200
Monthly Flow for the Year of 1911:				
January—a	.....	.....	10.0	615
February—a	.....	.....	10.0	555
March	22	15	16.2	996
April	91	17	33.9	2,020
May	222	63	105	6,460
June	475	130	339	20,200
July	294	68	146	8,980
August	73	31	43.5	2,670
September	56	23	33.5	1,990
October	46	24	35.0	2,150
November	36	15	22.2	1,320
December—a	.....	.....	15.0	922
Total Recorded	475	.....	67.6	48,900
Mean Monthly Flow for the Period of Record:				
January	.....	.....	20.0	1,230
February	.....	.....	18.3	1,020
March	119	15	31.1	1,910
April	228	17	59.9	3,560
May	386	28	141	8,670
June	1,400	76	316	18,800
July	392	23	123	7,560
August	89	22	39.5	2,430
September	271	14	31.9	1,900
October	59	18	28.6	1,760
November	158	15	34.0	2,020
December	59	.....	23.2	1,430
Mean Yearly	1,400	.....	72.2	52,300

a—Estimated.
b—Discharge interpolated June 6 to 28, 1908.
Reference for daily flow in U. S. G. S. Water Supply papers 214, 252, 272, 292, and 312.

CROW CREEK.

Observation Station Located in E ½ Sec. 15, T. 20 N., R. 21 W., at Lozeau's Ranch Near Ronan, Mont.

Established in 1911.

Character of Drainage Basin: Mountains at the head, irrigated valley below.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
May	386	100	156.0	9,590
June	960	124	413	24,600
July	515	61	181	11,100
August	61	33	48.6	2,990
September	78	46	55.7	3,310
October	78	46	63.1	3,880
November	61	23	48.6	2,890
December	61	28	41.8	2,570
Total Recorded	.....	.....	.....	60,900

Other measurements near this station have been made as follows in 1909:

Aug. 7, ... 89.7 second-feet.
Aug. 13, ... 78.8 second-feet.
Sept. 17 ..... 61.6 second-feet.

Reference for daily flow: U. S. G. S. Water Supply papers 272 and 312.

MUD CREEK.

Observation Station Located in T. 21 N., R. 20 W., 3 Miles Northwest of Ronan, Mont.

Established in 1908.

Drainage Area, 42 square miles.

Character of Drainage Basin: Rolling valley land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April, 17–30	7	5	6.29	175
August	14	8	9.77	601
September	9	2.8	5.30	315
October	8.5	8	8.10	498
November	8	7	7.60	452
December	7.5	6	6.89	260
Total Recorded	.....	.....	.....	2,300
Monthly Flow for the Year of 1909:				
March	8.3	1.7	4.10	252
April	5.2	1.6	2.85	170
May	6.9	2.5	4.96	305
June	39	1.8	16.5	982
July	33	17	24.7	1,520
August	20	8.3	14.2	873
September	16	6.3	9.56	569
October	6.9	2.9	6.27	386
November	6.3	5.2	5.60	333
December	5.2	3.9	4.37	269
Total Recorded	.....	.....	.....	5,660
Monthly Flow for the Year of 1910:				
January	.....	.....	a4.0	246
February	.....	.....	a5.0	278
March	20	6.8	10.7	658
April	14	6.8	7.56	450
May	20	8.8	12.7	781
June	14	11	12.4	738
July	7.2	3.5	5.12	315
August	4.6	4.0	4.17	256
September	4.1	3.5	3.65	217
October	3.5	3.4	3.46	213
November	4.1	3.4	3.82	227
December	3.8	3.4	3.48	214
Total Recorded	.....	.....	6.34	4,590

a—Estimated.

Note—A measurement of Mud Creek near Ronan on September 20, 1906, showed a discharge of 2.55 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply papers 214, 252, 272 and 292.

MISSION CREEK.

Observation Station Located in T. 18 N., R. 20 W., 1 Mile Below St. Ignatius, Mont.

Established in 1906.

Drainage Area, 58 square miles.

Character of Drainage Basin: Mountains and rolling irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
September, 21-30	65	50	54.4	1,080
October	57	45	50.5	3,110
November	69	34	48.1	2,860
December	40	33	36.5	2,240
Total Recorded	.....	.....	.....	9,290
Monthly Flow for the Year of 1907:				
January—a	32	10	16.9	1,040
February	21	13	14.4	800
March	34	16	20.2	1,240
April	54	27	36.7	2,180
May	236	41	103	6,330
June—a	442	154	236	14,000
July	550	160	293	18,000
August	160	75	107	6,580
September	87	51	70.9	4,220
October	48	30	38.5	2,370
November	30	14	21.1	1,260
December	14	10	11.8	726
Total Recorded	550	10	80.8	58,700
Monthly Flow for the Year of 1908:				
January—a	10	8	9.87	607
February	10	8	9.03	519
March	11	8	9.97	613
April	86	10	29.7	1,770
May	236	53	120	7,380
June—a	2,000	218	823	49,000
July	440	92	230	14,100
August	92	55	73.5	4,520
September	120	44	58.6	3,490
October	55	44	47.7	2,930
November	44	34	41.3	2,460
December	34	25	29.5	1,810
Total Recorded	2,000	8	124	89,200
Monthly Flow for the Year of 1909:				
January	58	22	29.3	1,800
February	22	16	19.0	1,060
March	16	16	16.0	984
April	16	13	15.0	893
May	207	16	49.7	3,060
June	602	151	275	16,400
July	311	127	191	11,700
August	118	58	81.6	5,020
September	73	45	51.8	3,080
October	63	40	47.5	2,920
November	58	30	41.3	2,460
December	30	21	24.4	1,500
Total Recorded	602	13	70.5	50,900
Monthly Flow for the Year of 1910:				
January	22	19	19.9	1,220
February	50	18	26.2	1,460
March	55	19	25.6	1,570
April	115	20	40.1	2,390
May	195	50	98	6,030
June	205	67	122	7,260
July	89	34	48	2,950
August	37	24	30.8	1,890
September	28	24	26.7	1,590
October	34	28	30.8	1,890
November	37	31	31.6	1,880
December	26	22	23.5	1,440
Total Recorded	205	18	43.6	31,600
Monthly Flow for the Year of 1911:				
January	16	10	14.7	904
February	13	8	11.0	611

MISSION CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
April	29	10	16.3	970
May	82	29	47.0	2,890
June	380	70	234	13,900
July	243	104	171	10,500
August	100	58	77.6	4,770
September	66	48	52.6	3,130
October	61	36	45	2,770
November	36	27	30.5	1,810
Total Recorded	.....	.....	.....	42,300
Mean Monthly Flow for the Period of Record:				
January	58	8	18.1	1,110
February	50	8	15.9	883
March	55	8	17.9	1,100
April	115	10	27.6	1,640
May	236	16	83.5	5,130
June	2,000	67	338	20,100
July	550	34	187	11,500
August	160	24	74.1	4,460
September	120	24	52.3	3,110
October	63	28	43.3	2,660
November	69	14	37.3	2,220
December	40	10	25.1	1,540
Mean Yearly	2,000	8	76.7	55,500

a—Estimated for part of the month.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 214, 252, 272, 292 and 312.

DRY CREEK.

Observation Station Located 3½ Miles S. E. of St. Ignatius, Mont.

Established in 1908.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1908:				
April, 16–30	21	7	12.2	363
May	48	10	27.3	1,680
June	250	48	119	7,080
July	92	28	54.7	3,360
August	28	3	11.5	707
September	17	1	6.93	412
October	7	3	5.16	317
November	5	0	3.13	186
Total Recorded	.....	.....	.....	14,100
Monthly Flow for the Year of 1909:				
May, 9–31	44	0.0	10.8	492
June	144	32	75.0	4,460
July	95	29	49.4	3,040
August	29	2.2	8.97	552
September	4.2	1.0	2.35	140
October	7.0	0	3.54	218
November	7.0	0	.99	58.9
Total Recorded	.....	.....	.....	8,960
Monthly Flow for the Year of 1910:				
January	.....	.....	0	.....
February	.....	.....	0	.....
March	.....	.....	0	.....
April	22	0	3.7	220
May	48	7	28.7	1,760
June	48	19	27.2	1,620
July	25	1	10.1	621
August	.....	.....	0	.....
September	.....	.....	0	.....

DRY CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
October	.....	.....	0	.....
November	.....	.....	0	.....
December	.....	.....	0	.....
Total Recorded	.....	.....	.....	4,220
Monthly Flow for the Year of 1911:				
May, 6–31	11	0	4.0	206
June	150	4	77.2	4,590
July	78	20	41.0	2,520
August	20	0	4.9	301
Total Recorded	.....	.....	.....	7,620

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 252, 272, 292 and 312.

POST CREEK NEAR RONAN, MONTANA.

The original station was at Fitzpatrick's ranch, and was maintained from 1906 through 1910. During 1911 a station was maintained at Deschamp's ranch, about a mile and a half below Fitzpatrick's. This station proved unsatisfactory, so a new one was established on Septmeber 18, 1911, at the new highway bridge on the section line between the S. W. ¼ N. W. ¼ Sec. 24, and the S. E. ¼ N. E. ¼ Sec. 23, Twp. 19 N., R. 20 W. This is about three miles below the original station.

POST CREEK.

Observation Station Located in T. 19 N., R. 19 W., 10 Miles North of Ronan, Mont.—(Formerly Called Near St. Ignatius).

Established in 1906.
Drainage Area, 46 square miles.
Character of Drainage Basin: Mostly mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
September, 21–30	59	54	57.0	1,130
October	64	50	55.5	3,410
November	88	54	65.5	3,900
December	54	50	50.3	3,090
Total Recorded	.....	.....	.....	11,530
Monthly Flow for the Year of 1907:				
January	.....	.....	a40.0	2,460
February	.....	.....	a40.0	2,220
March	39	35	37.2	2,290
April	56	39	45.4	2,700
May	290	39	106	6,520
June	412	153	261	15,500
July	410	196	259	15,900
August	196	58	116	7,130
September	99	38	55.7	3,310
October	38	31	33.7	2,070
November	31	25	28.6	1,700
December	28	25	26.8	1,650
Total Recorded	412	25	87.4	61,400
Monthly Flow for the Year of 1908:				
January	25	20	22.6	1,390
February	30	22	25.1	1,440
March	35	27	30.7	1,890
April	103	29	53.7	3,200
May	178	72	123	7,560
June	2,800	191	1,030	61,300
July	346	144	253	15,600

POST CREEK—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
August	136	51	79.5	4,890
September	136	41	67.2	4,000
October	51	32	35.3	2,170
November	36	36	36.0	2,140
December	36	24	32.5	2,000
Total Recorded	2,800	20	149	108,000
Monthly Flow for the Year of 1909:				
January	32	24	26.5	1,630
February	24	24	24	1,330
March	57	24	29.1	1,790
April	32	24	28.1	1,670
May	213	32	66.3	4,080
June	1,020	136	304	18,100
July	331	78	210	12,900
August	78	78	78	4,800
September	78	55	62.2	3,700
October	63	50	52.5	3,230
November	70	50	55.7	3,310
December	51	32	43.9	2,700
Total Recorded	1,020	24	81.7	59,200
Monthly Flow for the Year of 1910:				
January	35	26	28.8	1,770
February	35	24	31.2	1,730
March	54	27	37.2	2,290
April	127	27	59.3	3,530
May	260	86	165	10,100
June	356	116	172	10,200
July	140	56	93.8	5,770
August	62	45	55.2	3,390
September	45	27	35.9	2,140
October	50	31	38.5	2,370
November	96	35	52.5	3,120
December	40	27	31.9	1,960
Total Recorded	356	24	66.9	48,400
Mean Monthly Flow for the Period of Record:				
January	.....	20	29.5	1,810
February	.....	22	30.1	1,670
March	57	24	33.6	2,070
April	127	24	46.6	2,770
May	290	32	115	7,070
June	2,800	116	442	26,300
July	410	56	204	12,500
August	196	45	82.2	5,050
September	136	27	55.4	3,300
October	64	31	43.1	2,650
November	96	25	47.7	2,840
December	54	24	37.1	2,280
Mean Yearly	2,800	20	97.2	70,300

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 214, 252, 272 and 292.

POST CREEK AT DESCHAMP'S RANCH.

Observation Station Located Near Ronan, Montana.

Established in 1911.

Character of Drainage Basin: Mostly mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
April, 20–30	50	9	36.6	799
May	130	38	66.0	4,060
June	548	95	329	19,600
July	548	136	239	14,700
August	136	53	91.8	5,640
September	62	32	40.4	2,400
October	46	32	35.7	2,200
November, 1–11	32	32	32.0	698
Total Recorded	.....	.....	.....	50,100

Reference for daily flow in U. S. G. S. Water Supply paper 312.

POST CREEK AT HIGHWAY BRIDGE.

Observation Station Located Near Ronan, Mont.

Established in 1911.

Character of Drainage Basin: Mostly mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
September, 19–30	81	64	67.7	1,610
October	112	59	72.3	4,450
November	59	49	53.1	3,160
December	54	43	48.4	2,980
Total Recorded	.....	.....	.....	12,200

Reference for daily flow in U. S. G. S. Water Supply paper 312.

JOCKO RIVER.

Observation Station Located in T. 16 N., R. 19 W., 1¼ Mile Northwest of Jocko, Mont.

Established in 1908. See note.

Drainage Area, 122 square miles.

Character of Drainage Basin: Mostly mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 13–30	111	65	86.7	3,100
May	957	116	369	22,700
June	1,480	497	946	56,300
July	551	254	355	21,800
August	249	153	194	11,900
September	165	128	140	8,330
October	134	105	117	7,190
November	191	84	123	7,320
Total Recorded	...	...	...	139,000
Monthly Flow for the Year of 1910:				
January	...	...	a85	5,230
February	...	...	a85	4,720

JOCKO RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
March	154	85	110	6,760
April	713	111	327	19,500
May	880	403	551	33,900
June	630	103	311	18,500
July	100	24	55.3	3,400
August	57	21	32.3	1,990
September	78	51	58.8	3,500
October	138	52	67.2	4,130
November	146	85	104	6,190
December	...	..	a75	4,610
Total Recorded	880	21	155	112,000
Monthly Flow for the Year of 1911:				
January	...	...	a70	4,300
February	...	...	a65	3,610
March	...	...	a80	4,920
April	380	80	176	10,500
May	656	280	408	25,100
June	935	550	724	43,100
July	519	103	243	14,900
August	134	98	118	7,260
September	126	96	109	6,490
October	118	89	107	6,580
November	106	80	96	5,710
December	...	...	a75	4,610
Total Recorded	935	...	189	137,000

a—Estimated.

Note—Only a few gage heights were read during 1908, and the following measurements were made: June 6, estimated by floats, 6,200 sec.ft.; August 20, 141 sec.ft.; October 7, 95.7 sec.-ft., and November 6, 121 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply papers, 252, 272, 292 and 312.

JOCKO RIVER.

Observation Station Located in T. 18 N., R. 20 W., at Ravalli, Mont.

Established in 1906.

Elevation of Station, 2,700 feet.

Drainage Area, 338 square miles.

Character of Drainage Basin: Mountains and irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1906:				
October, 18-31	262	152	179	4,970
November	493	162	224	13,300
December	208	173	188	11,600
Total Recorded	...	...	...	29,900
Monthly Flow for the Year of 1907:				
January	184	152	166	10,200
February	324	173	200	11,100
March	324	196	246	15,100
April	472	234	344	20,500
May	1,500	308	842	51,800
June	1,860	815	1,190	70,800
July	1,180	358	585	36,000
August	376	262	312	19,200
September	277	234	245	14,600
October	234	184	208	12,800
November	184	162	177	10,500
December	162	142	157	9,659
Total Recorded	1,860	142	389	282,000
Monthly Flow for the Year of 1908:				
January	142	108	125	7,690
February	514	92	131	7,540

JOCKO RIVER—(Continued).

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
March	142	92	114	7,010
April	605	124	238	14,200
May	760	324	550	33,800
June	7,500	731	2,410	143,000
July	693	329	479	29,500
August	329	286	302	18,600
September	428	228	286	17,000
October	247	210	220	13,500
November	210	193	200	11,900
December	193	160	172	10,600
Total Recorded	7,500	92	436	314,000
Monthly Flow for the Year of 1909:				
January	...	...	a150	9,220
February	...	...	a150	8,330
March	202	164	181	11,100
April	202	182	187	11,100
May	1,240	182	486	29,900
June	1,540	345	914	54,400
July	620	264	406	25,000
August	315	224	255	15,700
September	207	192	195	11,600
October	192	179	183	11,300
November	224	168	185	11,000
December	179	179	b179	11,000
Total Recorded	1,540	...	289	210,000
Monthly Flow for the Year of 1910:				
January	...	...	a170	10,500
February	...	...	a170	9,440
March	...	...	a200	12,300
April	1,120	235	602	35,800
May	1,590	705	942	57,900
June	705	205	392	23,300
July	180	110	138	8,480
August	180	110	125	7,690
September	180	155	167	9,940
October	250	167	180	11,100
November	220	167	191	11,400
December	167	120	148	9,100
Total Recorded	1,590	110	285	207,000
Monthly Flow for the Year of 1911:				
January	140	100	114	7,010
February	138	98	110	6,110
March	175	98	131	8,060
April, 1 to 8	200	175	191	3,030
Total Recorded	...	...	...	24,200
Mean Monthly Flow for the Period of Record:				
January	184	100	145	8,920
February	514	92	152	8,440
March	324	92	174	10,700
April	1,120	124	334	19,900
May	1,590	182	705	43,300
June	7,500	205	1,230	73,200
July	1,180	110	402	24,700
August	376	110	248	15,200
September	428	155	223	13,300
October	262	152	196	12,100
November	493	162	195	11,600
December	208	120	169	10,400
Mean Yearly	7,500	92	348	252,000

a—Estimated.
b—Mean of 16 days taken as mean for December, 1909.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 214, 252, 272, 292 and 312.

BIG KNIFE CREEK (UPPER STATION).

Observation Station Located in T. 16 N., R. 19 W., Near Jocko, Mont.

Established in 1910.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1910:				
August	9.0	8.0	8.3	510
September	8.3	6.9	7.5	446
October	7.2	6.3	6.6	406
November	6.7	5.7	6.1	363
Total Recorded	...	...	...	1,720
Monthly Flow for the Year of 1911:				
April	6.6	4.3	4.70	280
May	18	5.6	8.98	552
June	40	21	32.0	1,900
July	30	16	20.6	1,270
August	16	12	13.4	824
September	12	9.4	10.7	637
October	10	8.2	8.88	546
Total Recorded	..	...	....	6,010

Reference for daily flow in U. S. G. S. Water Supply Papers 292 and 312.

BIG KNIFE CREEK.

Observation Station Located in T. 17 N., R. 19 W., 2½ Miles Northeast of Jocko, Mont.

Established in 1908. See note.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 13-30	7.8	6.8	7.08	253
May	22	7.7	12.0	738
June	52	28	37.4	2,230
July	43	22	27.9	1,720
August	22	15.4	18.0	1,110
September	17.6	13.0	14.4	857
October	13.5	10.5	11.7	719
November	11.2	9.7	10.3	613
Total Recorded	....	....	....	8,240
Monthly Flow for the Year of 1910:				
January—a	....	....	7.8	480
February—a	....	....	7.5	416
March	8.9	7.5	7.8	480
April	22	7.5	14.0	833
May	32	13	19.2	1,180
June	22	13	17.4	1,040
July	15	12	13.2	812
August	12	3.7	8.90	547
September	1.4	.9	1.14	68
October	1.1	.9	1.00	61
November	10	8.6	9.20	547
December—a	....	....	8.5	523
Total Recorded	32	.9	9.6	6,990

a—Estimated.

Discontinued and a new station established above Jocko Canal.

Note—Only a few gage heights were read during 1908, and the following measurements were made: August 1, 22.3 sec.-ft.; August 19, 14.8 sec.-ft.; October 8, 13.0 sec.-ft., and November 5, 11.0 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply papers 252, 272 and 292.

AGENCY CREEK.

Observation Station Located in T. 16 N., R. 19 W., Two Miles East of Jocko, Mont.
Established in 1908. See Note.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 16-30	10.6	4.4	6.43	191
May	69	10.3	22.9	1,410
June	104	49	69.8	4,150
July	70	15.3	34.0	2,090
August	24	8.6	12.1	744
September	10.3	7.6	8.51	506
October	8.0	5.6	6.58	405
November	6.8	5.1	5.95	354
Total Recorded	...	...	....	9,850
Monthly Flow for the Year of 1910:				
January	...	...	a6	369
February	...	...	a6	333
March	7.2	...	a6.5	400
April	50	5	21.5	1,280
May	60	23	38.9	2,390
June	41	14	24.1	1,430
July	12	6.7	8.94	550
August	6.5	5.1	5.62	346
September	6.7	4.6	5.24	312
October	5.5	4.2	4.73	291
November	7.8	4.6	5.43	323
December	....	....	a5.0	307
Total Recorded	60	....	11.5	8,330
Monthly Flow for the Year of 1911:				
April	12	3.1	5.16	307
May	31	9.2	17.8	1,090
June	68	34	45.7	2,720
July	33	11	18.5	1,140
August	11	6.6	8.49	522
September	9.6	6.4	8.03	478
October	9.0	6.3	7.79	479
Total Recorded	...	...	....	6,740

a—Approximate.

Note—Only a few gage heights were read during 1908, and the following measurements were made: August 5, 13.8 sec.-ft.; August 19, 10.2 sec.-ft.; October 8, 7.6 sec.-ft., and November 5, 8.0 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 252, 272, 292 and 312.

BLODGETT CREEK.

Observation Station Located in T. 16 N., R. 20 W., 1½ Miles Northeast of Jocko, Mont.
Established in 1909.
Character of Drainage Basin: Mountainous and irrigated land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
May, 22-31	2.2	1.1	1.67	33.1
June	3.4	2.0	2.61	155
July	2.2	1.3	1.72	106
August	1.3	.8	1.03	63.3
September	1.0	.6	.69	41.1
October	.7	.5	.55	33.8
November	.5	.4	.44	26.2
Total Recorded	..	..	...	458

The discharge for 1910 was approximately 0.5 sec.-ft. per day, or 365 acre-feet for the year.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 272 and 292.

FINLEY CREEK.

Observation Station Located in T. 16 N., R. 19 W., 2½ Miles South of Jocko, Mont.
Established in 1908. See note.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Min'mum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 15-30	56	19.4	32.5	1,030
May	185	34	70.5	4,330
June	269	68	147	8,750
July	62	19.4	35.0	2,150
August	24	9.3	15.0	922
September	19.4	9.3	12.2	726
October	12.0	9.3	9.39	577
November	19.4	9.3	11.1	660
Total Recorded	....	...	....	19,100
Monthly Flow for the Year of 1910:				
April	136	20	55.3	3,290
May	115	43	60.2	3,700
June	43	12	23.1	1,370
July	11	6.2	8.45	520
August	6.2	4.7	5.38	331
September	7.8	5.0	6.97	415
October	8.6	7.4	8.22	505
November	11	8.2	9.23	549
Total Recorded	....	....	....	10,700
Monthly Flow for the Year of 1911:				
April	24	8.2	11.6	690
May	57	19	38.6	2,370
June	110	46	81.9	4,870
July	44	14	24.9	1,530
August	13	7.1	10.1	621
September	10	7	8.12	483
October	13	8.8	9.90	609
Total Recorded	..	...	....	11,200

Note—Only a few gage heights were read in 1908, and the following measurements were made: August 10, 14.8 sec.-ft.; August 19, 15.3 sec.-ft.; October 8, 9.5 sec.-ft., and November 5, 10.4 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers 252, 272, 292 and 312.

EAST FINLEY CREEK.

Observation Station Located in T. 18 N., R. 18 W., Four Miles Southeast of Jocko, Mont.
Established in 1908. See note.
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 15-30	5.3	3.6	4.26	135
May	94	6.9	26	1,600
June	132	34	67.5	4,020
July	48	14	25.5	1,570
August	19	6	9.69	596
September	11	4.1	6.97	415
October	6.5	4.1	5.18	318
November	6.8	4.1	5.21	310
Total Recorded	...	...	....	8,960

Note—Only a few gage heights were obtained in 1908, and the gage was read during 1910 and up to July, 1911, but the rating was unsatisfactory. Measurements in those years were made as follows:

1908—August 4, 12.8 sec.-ft.; August 18, 9.4 sec.-ft.; October 8, 7.7 sec.-ft., and November 5, 8.3 sec.-ft.

1910—April 20, 35 sec.-ft.; May 30, 22.0 sec.-ft.; June 23, 17.6 sec.-ft.; August 20, 3.3 sec.-ft., and October 7, 5.5 sec.-ft.

1911—January 11, 2.9 sec.-ft.; March 23, 3.06 sec.-ft.; April 29, 16 sec.-ft.; June 14. 64 sec.-ft.; July 3, 27 sec.-ft., and August 6, 0.5 sec.-ft. On August 6, 7.2 sec.-ft. were diverted into ditch above gage.

Reference for daily flow in U. S. G. S. Water Supply Papers 252, 272, 292 and 312.

INDIAN DITCH.

Observation Station Located 50 Feet Below East Finley Gage, Near Jocko, Mont.
Established in 1908. See note.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 17-30	3.0	1.8	2.02	56
May	28	1.6	8.45	520
June	20	2.0	10.7	637
July	22	8.0	14.2	873
August	12.5	4.4	6.78	417
September	7.6	4.2	5.11	304
October	5.0	3.4	4.08	251
November	4.6	3.5	3.98	237
Total Recorded	...	...	....	3,300
Monthly Flow for the Year of 1910:				
April	24	1.0	13	774
May	17	12	14.2	873
June	22	14	18.8	1,120
July	13	5.6	8.02	493
August	5.3	2.3	3.93	242
September	6.2	3.6	4.45	265
October	5.1	3.6	4.69	288
November	6.4	4.3	5.36	319
Total Recorded	...	...	....	4,370
Monthly Flow for the Year of 1911:				
April	17	2.6	5.21	310
May	26	0	10.4	640
June	23	11	16.5	982
July	14	2.5	9.59	590
Total Recorded	..	...	....	2,520

Note—Only a few gage heights were read during 1908, and the following measurements were made: August 18, 5.5 sec.-ft.; October 8, 6.6 sec.-ft., and November 5, 5.7 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply papers 252, 272, 292 and 312.

VALLEY CREEK.

Observation Station Located in T. 17 N., R. 20 W., Three Miles East of Ravalli, Mont.
Established in 1908. See note.
Drainage Area, 63 square miles.
Character of Drainage Basin: Mostly rolling prairie.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1909:				
April, 17-30	...	..	28.3	786
May	252	33	116	7,130
June	290	69	169	10,100
July	69	33	52.6	3,230
August	33	19.1	24.3	1,490
September	38	19.1	21.9	1,300
October	21	19.1	20.2	1,240
November	49	19.1	24.0	1,430
Total Recorded	..	....	....	26,700
Monthly Flow for the Year of 1910:				
March, 20-31	...	..	76.4	1,820
April	172	40	98.7	5,870
May	161	64	107	6,580
June	79	26	42.3	2,520
Total Recorded	..	..	....	16,800

Note—The station was discontinued June 1, 1910. Other measurements on this stream have been made as follows: August 20, 1908, 22.4 sec.-ft.; October 7, 1908, 18.9 sec.-ft.; November 6, 1908, 19.1 sec.-ft.; January 10, 1911, 12.6 sec.-ft.; March 22, 1911, 17.2 sec.-ft.; June 14, 1911, 83 sec.-ft.; July 2, 1911, 57 sec.-ft.
Reference for daily flow in U. S. G. S. Water Supply Papers 252, 272, 292 and 312.

REVAIS CREEK.

Observation Station Located in T. 18 N., R. 22 W., 4 Miles Northwest of Dixon, Mont.

Established in 1911.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911.				
May	144	45	69.3	4,260
June	154	55	102	6,070
July	67	14	32.1	1,970
August	18	11	13.8	848
September	18	8	13.6	809
October	18	11	14.8	910
November	14	11	11.3	672
December	11	8	10.4	640
Total Recorded	.....	.....	.....	16,200

Reference for daily flow in U. S. G. S. Water Supply Paper 312.

THOMPSON RIVER.

Observation Station Located in S. E. ¼ Sec. 7, T. 21 N., R. 28 W., Near Thompson, Mont.

Established in 1911.

Character of Drainage Basin: Mountainous and forested.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean	Total Acre Feet
Monthly Flow for the Year of 1911:				
January	.....	.....	a150	9,220
February	.....	.....	a160	8,890
March	625	150	338	20,800
April	1,260	460	963	57,300
May	1,690	970	1,240	76,200
June	1,580	880	1,180	70,200
July	970	375	547	33,600
August	430	198	307	18,900
September	335	190	256	15,200
October	208	150	181	11,100
December	.....	.....	a150	9,220
Total Recorded	.....	.....	.....	331,000

a—Estimated.

Reference for daily flow in U. S. G. S. Water Supply paper 312.

PROSPECT CREEK.

Observation Station Located in N. E. ¼, N. E ¼, Sec. 18, T. 21 N., R. 29 W., Near Thompson, Montana.

Character of Drainage Basin: Mountainous and forested.

Gage heights were read at irregular intervals during 1911. The following measurements of discharge were made:

Feb. 12, 1911	74	second-feet.
June 20, 1911	396	second-feet.
July 27, 1911	142	second-feet.
Sept. 23, 1911	79	second-feet.
Oct. 7, 1911	53	second-feet.

Reference: U. S. G. S. Water Supply Paper No. 312.

MISCELLANEOUS MEASUREMENTS IN CLARK FORK OF COLUMBIA RIVER DRAINAGE BASIN IN MONTANA.

Date.	Stream.	Tributary to—	Locality.	Discharge
Oct. 7, 1911	Dry Creek	Clark Fork	Thompson	9.2
Sept. 30, 1897	Bitterroot River	.....do	Near Como	800
Oct. 29, 1898	.....do	.....do	.....do	333
Jan. 21, 1899	.....do	.....do	.....do	384
Sept. 30, 1897	Rock Creek	Bitterroot River	Como	4.0
Sept. 29, 1911	Lost Horse Creek	.....do	Above mouth of S. Fk., near Como	15.5
Sept. 29, 1911	S. Fk. Lost Horse Creek	Lost Horse Creek	Near Lost Horse Lake	1.5
Sept. 29, 1911	.....do	.....do	Above mouth, near Como	7.3
Nov. 20, 1911	Mill Creek	Bitterroot River	Near Stevensville	19.4
Sept. 7, 1911	Lolo Creek	.....do	Near Lolo Hot Springs	44
Oct. 5, 1911	St. Joe Creek		Near St Regis	16.4
April 21, 1911	Flathead River	Clark Fork	Polson	7,110
July 21, 1911	M. Fk. Flathead	Flathead	Near Java	67
June 26, 1900	Big Creek	Flathead Lake		38
June 26, 1900	Dayton Creek	.....do	Just above mouth	31
June 28, 1900	Glen Creek	.....do	Near mouth	4
May 25, 1909	Sullivan Creek	Little Bitterroot	Dayton	8.6
July 28, 1909	.....do	.....do	.....do	15.9
June 30, 1900	Crow Creek	Flathead	Lower road 16 miles from St. Ignatius	180
Aug. 3, 1909	N. Fk Crow Creek	Crow Creek	Ronan	28.0
Sept. 10, 1909	.....do	.....do	.....do	12.1
Apr. 17, 1908	Spring Creek	.....do	.....do	12.7
May 20, 1908	.....do	.....do	.....do	13.2
June 27, 1908	.....do	.....do	.....do	18.3
July 20, 1908	.....do	.....do	.....do	17.8
Aug. 21, 1908	.....do	.....do	.....do	16.1
Oct. 7, 1908	.....do	.....do	.do	16.2
Nov. 12, 1908	.....do	.....do	.....do	18.8
Apr. 21, 1909	.....do	.....do	.....do	16.3
May 27, 1909	.....do	.....do	.....do	17.6
June 19, 1909	.....do	.....do	.....do	19.4
Apr. 20, 1911	.....do	.....do	.....do	17.2
June 13, 1911	.....do	.....do	.....do	16.3
Aug. 3, 1909	Mission Creek	Flathead	Damsite above St. Ignatius	87.5
Aug. 16, 1909	.....do	.....do	.....do	66.8
Sept. 9, 1909	.....do	.....do	.....do	52.6
Sept. 29, 1909	.....do	.....do	.....do	63.3
June 30, 1900	.....do	.....do	At St. Ignatius	412
June 13, 1911	Post Creek	Mission Creek	Lower bridge near St. Ignatius	489
June 30, 1900	.....do	.....do	Two miles above Mission Creek	473
Apr. 16, 1908	N. Fk. Post Creek	Post Creek	Ronan	2.9
May 19, 1908	.....do	.....do	.....do	20.2
July 19, 1908	.....do	.....do	.....do	29.6
Oct. 6, 1908	.....do	.....do	.....do	6.5
Nov. 9, 1908	.....do	.....do	.....do	5.9
Apr. 20, 1909	.....do	.....do	...do	3.4
May 27, 1909	.....do	.....do	.....do	11.8

MISCELLANEOUS MEASUREMENTS IN CLARK FORK OF COLUMBIA RIVER DRAINAGE BASIN IN MONTANA—(Continued).

Date.	Stream.	Tributary to—	Locality.	Discharge
June 19, 1909	N. Fk. Post Creek	Post Creek	Ronan	42.5
July 25, 1909 ...	.....do.....	.....do.....	.....do	21.1
Oct. 14, 1909 ...	.....do.....	.....do.....	.....do	6.1
Apr. 18, 1910 ...	.....do.....	.....do.....	.....do	4.7
Oct. 4, 1910	.....do.....	.....do.....	.....do	2.2
June 12, 1911	.....do.....	.....do.....	.....do	16.2
Nov. 20, 1911 ...	.....do.....	.....do.....	.....do	4.3
May 26, 1910 ...	Upper Ashley Creek	Mission Creek	St Ignatius	31
May 26, 1910 ...	Ashley Creek	.....do.....	.....do	5.1
June 21, 1910	.....do.....	.....do.....	.....do	20
Aug. 1, 1911 ...	Spring Creek	.....do.....	.....do	26
June 30, 1900	Jocko River	Flathead	N. P. Railway bridge	660
June 22, 1910 ...	Schley Creek	Jocko River	Jocko	4.5
Oct. 20, 1909	Spring Creek	.....do.....	Arlee	13.3
April 19, 1910 ...	.....do.....	.....do.....	.....do	11.6
May 29, 1910	.....do.....	.....do.....	.....do	11.8
June 22, 1910	.....do.....	.....do.....	.....do	12.5
Aug. 20, 1910	.....do.....	.....do.....	.....do	16.1
Oct. 6, 1910 ...	.....do.....	.....do.....	.....do	14.1

ST. MARY RIVER DRAINAGE BASIN.

St. Mary River and its tributaries drain about 450 square miles of the northern part of Montana immediately east of the continental divide.

The run-off is very great, but no suitable precipitation statistics are available for comparison.

ST. MARY RIVER NEAR BABB, MONTANA.

This station is about two miles south of Babb, and has been designated at various times by the following names: St. Mary at Damsite; St. Mary near St. Mary; St. Mary at U. S. R. S. Camp, and St. Mary near Babb.

No water is diverted above, but the United States Reclamation Service has appropriated 850 second-feet of water which will be diverted near the station.

Established in 1902.

Elevation of Station, 4,500 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 177 square miles.

Character of Drainage Basin: Forested mountains; the stream is fed by numerous glaciers.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
January	.....	.....	a110	0.62	6,760	0.71
February	.....	.....	a120	.68	6,660	.71
March	.....	.....	a100	.56	6,150	.65
April	223	120	146	.82	8,690	.91
May	4,000	190	1,729	9.77	106,000	11.26
June	3,760	950	1,862	10.52	111,000	11.74
July	4,360	1,160	2,164	12.23	133,000	14.10
August	1,160	565	785	4.44	48,300	5.12
September	515	258	342	1.93	20,400	2.15
October	258	190	221	1.25	13,600	1.44
November	190	127	156	.88	9,280	.98
December	.....	.....	a130	.73	7,990	.84
Total Recorded	4,360	.....	655	3.70	478,000	50.61
Monthly Flow for the Year of 1903:						
January	158	72	93	.53	5,720	.61
February	72	72	72	.41	4,000	.43
March	72	50	57	.32	3,510	.37
April	223	72	129	.73	7,680	.81
May	2,110	223	743	4.20	45,700	4.84
June	3,640	2,110	3,154	17.82	188,000	19.89
July	3,280	1,160	1,832	10.35	113,000	11.93
August	1,160	675	860	4.86	52,900	5.60
September	1,160	465	643	3.63	38,300	4.06
October	1,090	465	646	3.65	39,700	4.20
November	465	295	379	2.14	22,600	2.39
December	335	295	305	1.72	18,800	1.98
Total Recorded	3,640	50	743	4.20	540,000	57.10
Monthly Flow for the Year of 1904:						
January	.....	.....	a120	.68	7,380	.78
February	.....	.....	a 80	.45	4,600	.49
March	.....	.....	a 80	.45	4,920	.52
April	740	20	216	1.22	12,800	1.36
May	2,110	810	1,220	6.89	75,000	7.94
June	2,390	1,750	2,021	11.42	120,000	12.74
July	1,930	810	1,456	8.23	89,500	9.49
August	810	420	689	3.89	42,400	4.48
September	620	258	362	2.05	21,500	2.29
October	258	127	205	1.16	12,600	1.34
November	127	70	91	.51	5,420	.57
December	72	50	a 51	.29	3,140	.33
Total Recorded	2,390	.....	549	3.10	399,000	42.23

ST. MARY RIVER, NEAR BABB, MONTANA—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1905:						
January	.....	.....	a45	.254	2,780	.29
February	.....	.....	a40	.226	2,220	.24
March	145	45	79	.446	4,700	.51
April	410	115	161	.910	9,580	1.02
May	925	365	625	3.53	38,400	4.07
June	1,890	925	1,454	8.21	86,500	9.16
July	1,220	855	1,015	5.73	62,400	6.61
August	855	325	577	3.26	35,500	3.76
September	325	210	270	1.53	16,100	1.71
October	665	210	425	2.40	26,100	2.77
November	285	175	a204	1.15	12,100	1.28
December	.....	.....	a170	.960	10,400	1.11
Total Recorded	1,890	.....	422	2.38	307,000	32.53
Monthly Flow for the Year of 1906:						
January	.....	.....	a70	.396	4,300	.46
February	.....	.....	a65	.367	3,610	.38
March	90	65	a82.7	.467	5,080	.54
April	555	90	218	1.23	13,000	1.37
May	1,140	610	841	4.75	51,700	5.48
June	1,720	925	1,300	7.34	77,400	8.19
July	1,630	790	1,220	6.89	75,000	7.94
August	790	555	649	3.67	39,900	4.23
September	610	285	432	2.44	25,700	2.72
October	725	285	421	2.38	25,900	2.74
November	790	555	666	3.76	39,600	4.20
December	555	175	283	1.60	17,400	1.84
Total Recorded	1,720	.....	521	2.94	379,000	40.09
Monthly Flow for the Year of 1907:						
January	.....	.....	a80	.452	4,920	.52
February	.....	.....	a110	.622	6,110	.65
March	.....	.....	a80	.452	4,920	.52
April	388	142	234	1.32	13,900	1.47
May	1,710	388	1,010	5.71	62,100	6.58
June	2,980	1,370	2,370	13.4	141,000	14.92
July	2,980	1,290	2,090	11.8	129,000	13.61
August	1,290	640	893	5.05	54,900	5.82
September	905	532	694	3.94	41,300	4.40
October	532	202	343	1.94	21,100	2.24
November	202	90	136	.769	8,090	.86
December	90	47	74.5	.421	4,580	.49
Total Recorded	2,980	.....	676	3.82	492,000	52.08
Monthly Flow for the Year of 1908:						
January	.....	.....	a20	.113	1,230	.13
February	.....	.....	a50	.282	2,880	.30
March	.....	.....	a170	.960	10,500	1.11
April	1,130	171	474	2.68	28,200	2.99
May	1,670	835	1,300	7.34	79,900	8.46
June	7,980	1,460	3,400	19.2	202,000	21.42
July	1,680	832	1,380	7.80	84,800	8.99
August	800	418	554	3.13	34,100	3.61
September	372	266	301	1.70	17,900	1.90
October	328	208	264	1.49	16,200	1.72
November	247	.....	228	1.29	13,600	1.44
December	.....	.....	a85	.480	5,230	.55
Total Recorded	7,980	.....	686	3.87	497,000	52.62
Monthly Flow for the Year of 1909:						
May	1,960	161	479	2.71	29,500	3.12
June	3,900	1,860	2,670	15.1	159,000	16.85
July	2,180	407	1,320	7.46	81,200	8.60
August	1,130	538	775	4.38	47,700	5.05
September	605	252	386	2.18	23,000	2.43
October	252	161	217	1.23	13,300	1.42
November	515	161	399	2.25	23,700	2.51
Total Recorded	3,900	.....	.....	.....	377,000	.....

ST. MARY RIVER, NEAR BABB, MONTANA—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1910:						
January	.....	.....	a130	.734	7,990	.85
February	.....	.....	a140	.791	7,780	.82
March	330	.....	a177	1.00	10,900	1.15
April	1,290	230	519	2.93	30,900	3.27
May	1,660	935	1,250	7.06	76,900	8.14
June	1,710	1,060	1,380	7.80	82,100	8.70
July	1,100	550	793	4.48	48,800	5.16
August	525	230	363	2.05	22,300	2.36
September	330	215	255	1.44	15,200	1.61
October	875	330	573	3.24	35,200	3.74
November	500	295	433	2.45	25,800	2.73
December	260	.....	a193	1.09	11,900	1.26
Total Recorded	1,710	.....	517	2.92	376,000	39.79
Monthly Flow for the Year of 1911:						
January	.....	22	b85.3	.482	5,240	.56
February	.....	c4	b77.3	.437	4,290	.46
March	102	62	b76.2	.431	4,690	.50
April	390	80	154	.870	9,160	.97
May	1,440	500	988	5.58	60,800	6.43
June	2,460	815	1,950	11.0	116,000	12.27
July	1,520	700	991	5.60	60,900	6.46
August	675	390	529	2.99	32,500	3.45
September	675	370	600	3.39	35,700	3.78
October	550	182	330	1.87	20,300	2.16
November	182	70	129	.729	7,680	.81
December	90	33	54.0	.305	3,320	.35
Total Recorded	2,460	c4	498	2.81	361,000	38.20
Mean Monthly Flow for the Period of Record:						
January	.....	.....	83.7	.473	5,150	.55
February	.....	c4	83.7	.473	4,650	.49
March	330	45	100	.565	6,150	.65
April	1,290	20	250	1.41	14,900	1.57
May	4,000	161	1,020	5.76	62,700	6.64
June	7,980	815	2,160	12.2	129,000	13.61
July	4,360	407	1,430	8.08	87,900	9.32
August	1,290	230	667	3.77	41,000	4.35
September	1,160	210	428	2.42	25,500	2.70
October	1,090	127	364	2.06	22,400	2.38
November	790	70	282	1.59	16,800	1.77
December	555	33	135	.763	8,300	.88
Mean Yearly	7,980	c4	584	3.30	424,000	44.91

a—Mean for month estimated.
b—Estimated January 10 to February 7, and February 19 to March 3, 1911.
c—Probably held back by ice at the outlet of St. Mary Lake, February 14, 1911.
Note—A measurement on June 16, 1900, showed a discharge of 750 second-feet.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 49, 85, 100, 130, 171, 207, 245, 265, 285 and 305.

ST. MARY RIVER BELOW SWIFTCURRENT CREEK.

Observation Station Located at Babb, Mont.

Established in 1901.
Elevation of Station, 4,400.
Elevation of Head Waters, 8,000 feet.
Drainage Area, 298 square miles.
Character of Drainage Basin: Forested mountains; stream fed by glaciers.

Month.	Discharge in Second-feet				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1901:						
July, 14–31	.....	...	1,906	6.40	68,000	4.29
August	1,574	653	932	3.13	57,300	3.61
September	677	485	576	1.93	34,300	2.15
October	465	326	401	1.35	24,700	1.56
November	345	265	292	.98	17,400	1.09
December	278	220	241	.80	14,800	.92
Total Recorded	...	...	...	...	216,000	....
Monthly Flow for the Year of 1902:						
January	220	146	193	.65	11,900	.75
February	232	185	205	.69	11,400	.72
March	195	165	181	.61	11,100	.70
April	373	165	257	.86	15,300	.96
May	4,862	373	2,490	8.36	153,000	9.67
June	4,130	2,178	2,873	9.64	171,000	10.76
July	6,692	1,568	2,737	9.18	168,000	10.59
August	1,507	780	1,090	3.66	67,000	4.22
September	750	293	488	1.64	29,000	1.83
October, 1–18	...	...	282	.95	10,100	.64
Total Recorded	...	...	...	....	648,000	....
Monthly Flow for the Year of 1910:						
May, 13–31	2,240	1,520	1,910	6.41	72,000	4.53
June	2,240	1,520	1,890	6.34	112,000	7.07
July	1,560	770	1,140	3.83	70,100	4.42
August	782	322	528	1.77	32,500	2.04
September	655	300	416	1.40	24,800	1.56
October	1,560	545	1,030	3.46	63,300	3.99
November	928	445	641	2.15	38,100	2.40
December	395	95	276	.926	17,000	1.07
Total Recorded	...	...	979	....	430,000	....
Monthly Flow for the Year of 1911:						
January	...	...	a155	.520	9,530	.60
February	...	...	a140	.470	7,780	.49
March	170	95	a130	.436	7,990	.50
April	895	170	358	1.20	21,300	1.34
May	2,430	895	1,680	5.64	103,000	6.50
June	3,560	2,070	3,040	10.2	181,000	11.38
July	2,340	1,060	1,600	5.37	98,400	6.19
August	1,200	512	827	2.78	50,800	3.20
September	1,200	512	1,020	3.42	60,700	3.82
October	805	291	478	1.60	29,400	1.84
November	291	135	208	.698	12,400	.77
December	152	...	a99.5	.334	6,120	.39
Total Recorded	3,560	...	812	2.72	588,000	37.02
Mean Monthly Flow for the Period of Record						
January	...	...	172	.578	10,600	.67
February	...	...	172	.578	9,550	.60
March	195	95	156	.524	9,590	.60
April	895	165	308	1.03	18,300	1.15
May	4,860	373	2,040	6.85	125,000	7.90
June	4,130	1,520	2,600	8.73	155,000	9.74
July	6,690	770	1,840	6.18	113,000	7.12
August	1,570	322	844	2.83	51,900	3.28
September	1,200	293	625	2.10	37,200	2.34
October	1,560	...	577	1.94	35,500	2.24
November	928	...	380	1.28	22,600	1.42
December	395	...	206	.692	12,700	.80
Mean Yearly	6,690	...	827	2.78	601,000	37.85

ST. MARY RIVER BELOW SWIFTCURRENT CREEK—(Continued).

a—Estimated January 1 to March 3 and December 26 to 31, 1911.

Note—This station was formerly known as "St. Mary at Main." Measurements have been made near this station in other years as follows:

1900—June 18, 2,290 sec.-ft.; August 6, 750 sec.-ft.; October 14, 552 sec.-ft.

1903—May 10, 918 sec.-ft., and a second measurement on May 10 of 953 sec.-ft.

1905—July 20, 1,320 sec.-ft.; September 23, 317 sec.-ft.

Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 49, 66, 75, 85, 100 171, 285 and 305.

ST. MARY RIVER NEAR CARDSTON, ALBERTA.

This station is one-fourth mile north of the boundary line between the United States and Canada, and seventeen miles south of Cardston, Alberta.

Established in 1902.

Elevation of Station, 4,200 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 452 square miles.

Character of Drainage Basin: Forested mountains and rolling prairies.

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
September	747	198	604	1.34	35,900	1.50
October	608	306	477	1.06	29,300	1.22
November	410	174	342	.76	20,400	.85
Total Recorded	...	...	...	....	85,600	....
Monthly Flow for the Year of 1903:						
January—a	1,105	575	855	1.89	52,600	2.18
February—a	1,155	410	913	2.02	50,700	2.10
March—a	2,755	827	1,269	2.81	78,000	3.24
April	2,565	365	1,068	2.36	63,600	2.63
May	3,060	870	1,720	3.81	106,000	4.39
June	6,175	4,075	5,200	11.50	309,000	12.82
July	4,855	1,900	2,924	6.47	180,000	7.46
August	1,900	1,105	1,404	3.11	86,300	3.59
September	2,300	710	1,109	2.45	66,000	2.73
October	1,687	575	917	2.03	56,400	2.34
November	870	365	535	1.18	31,800	1.32
December	675	288	438	.97	26,900	1.12
Total Recorded	6,175	288	1,529	3.38	1,110,000	45.92
Monthly Flow for the Year of 1904:						
January—a	288	174	224	.50	13,800	.58
February—b	...	...	200	.44	11,500	.47
March—b	...	...	200	.44	12,300	.51
April—b	...	...	935	2.07	55,600	2.31
May	3,273	1,260	2,022	4.47	124,000	5.15
June	3,493	2,135	2,794	6.18	166,000	6.90
July	2,565	1,208	1,860	4.12	114,000	4.75
August	1,208	575	931	2.06	57,200	2.37
September	640	288	420	.93	25,000	1.04
October	288	144	213	.47	13,100	.54
November	136	109	122	.27	7,260	.30
December	240	128	157	.35	9,650	.40
Total Recorded	3,493	109	840	1.86	610,000	25.32
Monthly Flow for the Year of 1905:						
January—b	...	...	90	.199	5,530	.23
February—b	...	...	75	.166	4,160	.17
March	198	153	171	.378	10,500	.44
April	870	163	295	.653	17,600	.73
May	1,987	640	1,215	2.69	74,700	3.10
June	3,272	1,832	2,461	5.44	146,000	6.07
July	1,987	1,315	1,642	3.63	101,000	4.18
August	1,430	515	847	1.87	52,100	2.16
September	460	288	371	.821	22,100	.92
October	1,370	325	772	.171	47,500	.20

ST. MARY RIVER NEAR CARDSTON, ALBERTA—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
November	545	211	298	.659	17,700	.74
December—b	...	...	240	.531	14,800	.61
Total Recorded	...	...	706	1.43	514,000	19.55
Monthly Flow for the Year of 1906:						
January—b	...	...	100	.221	6,150	.25
February—b	...	...	95	.210	5,280	.22
March—b	...	...	125	.277	7,690	.32
April	1,100	160	481	1.06	28,600	1.18
May	1,990	1,060	1,500	3.32	92,200	3.83
June	2,660	1,830	2,280	5.04	136,000	5.62
July	2,380	1,100	1,830	4.05	113,000	4.67
August	1,430	710	946	2.09	58,200	2.41
September	1,010	385	628	1.39	37,400	1.55
October	1,490	410	756	1.67	46,500	1.92
November	1,620	675	1,100	2.43	65,500	2.71
December	607	255	359	.794	22,100	.92
Total Recorded	2,660	...	850	1.88	619,000	25.60
Monthly Flow for the Year of 1907:						
January—b	...	...	150	.332	9,220	.38
February—b	...	...	200	.443	11,100	.46
March—b	...	...	150	.332	9,220	.38
April	685	225	489	1.08	29,100	1.20
May	3,490	590	1,930	4.27	119,000	4.92
June	5,620	3,260	4,260	9.42	253,000	10.51
July	4,830	2,010	3,120	6.90	192,000	7.96
August	2,010	830	1,330	2.94	81,800	3.39
September	1,330	1,080	1,210	2.68	72,000	2.99
October	1,040	365	567	1.25	34,900	1.44
November	365	174	244	.542	14,500	.60
December—b	...	...	157	.347	9,650	.40
Total Recorded	5,620	...	1,150	2.54	835,000	34.63
Monthly Flow for the Year of 1908:						
January—b	...	...	50	.111	3,070	.13
February—b	...	...	100	.221	5,750	.24
March—b	...	...	225	.498	13,800	.57
April	1,860	225	844	1.87	50,200	2.09
May	3,720	1,340	2,490	5.51	153,000	6.35
June—c	18,000	2,700	6,390	14.1	380,000	15.73
July—c	3,050	1,180	2,490	5.51	153,000	6.35
August	1,180	528	785	1.74	48,300	2.01
September	510	425	462	1.02	27,500	1.14
October	660	365	485	1.07	29,800	1.23
November	528	410	472	1.04	28,100	1.16
December—b	...	...	125	.277	7,690	.32
Total Recorded	18,000	...	1,240	2.75	900,000	37.32
Monthly Flow for the Year of 1909:						
April, 23-27	1,480	700	1,190	2.63	11,800	.49
May	4,050	700	1,750	3.87	108,000	4.46
June	5,380	2,880	4,480	9.91	267,000	11.06
July	5,010	1,040	2,330	5.15	143,000	5.94
September, 18-25	545	450	479	1.06	7,600	.32
October, 14-31	405	275	337	.75	12,000	.50
November, 1-20	828	265	593	1.31	23,500	.97
Total Recorded	...	...	...	....	573,000	...
Monthly Flow for the Year of 1910:						
January—d	...	...	150	.332	9,220	.38
February—d	...	...	160	.354	8,890	.37
March—d	...	...	530	1.17	32,600	1.35
April	2,820	528	1,190	2.63	70,800	2.93
May	2,960	1,610	2,320	5.13	143,000	5.91
June	2,960	1,600	2,240	4.96	133,000	5.53
July	1,640	803	1,170	2.59	71,900	2.99
August	803	355	580	1.28	35,700	1.42

ST. MARY RIVER NEAR CARDSTON, ALBERTA—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	912	374	553	1.22	32,900	1.36
October	1,470	701	1,040	2.30	64,000	2.65
November	1,010	588	742	1.64	44,200	1.83
December—d	505	...	293	.648	18,000	.75
Total Recorded	...	...	917	2.03	664,000	27.52
Monthly Flow for the Year of 1911:						
January—e	...	...	170	.376	10,500	.43
February—e	...	...	150	.332	8,330	.35
March—e	...	...	145	.321	8,920	.37
April	1,040	177	478	1.06	28,400	1.18
May	3,810	952	2,040	4.51	125,000	5.20
June	3,890	2,380	3,470	7.68	206,000	8.57
July	2,470	1,190	1,680	3.72	103,000	4.29
August	1,740	696	1,050	2.32	64,600	2.68
September	1,440	1,020	1,260	2.79	75,000	3.11
October	992	398	621	1.37	38,200	1.58
November—e	446	200	346	.765	20,600	.85
December—e	310	100	195	.431	12,000	.50
Total Recorded	3,890	...	968	2.14	701,000	29.11
Mean Monthly Flow for the Period of Record:						
January	...	...	224	.496	13,800	.57
February	...	...	237	.524	13,200	.55
March	...	...	352	.779	21,600	.90
April	2,320	160	732	1.62	43,600	1.81
May	4,050	590	1,890	4.18	116,000	4.82
June	18,000	1,600	3,730	8.26	222,000	9.22
July	5,010	803	2,120	4.69	130,000	5.41
August	2,010	355	984	2.18	60,500	2.51
September	2,300	198	728	1.61	43,300	1.80
October	1,690	144	630	1.39	38,700	1.60
November	1,620	109	475	1.05	28,300	1.17
December	675	100	246	.544	15,100	.63
Mean Yearly	18,000	...	1,030	2.28	746,000	30.99

a—Discharge recorded may be too high, due to ice.
b—Discharge estimated for ice conditions.
c—Discharges June 5 to July 26 were obtained by comparison with the station near Babb.
d—Estimated January 1 to March 13, and December 10 to 31, 1910.
e—Estimated January 1 to March 31, and December 16 to 31, 1911.
Reference for daily flow in U. S. G. S. Water Supply Papers Nos. 85, 100, 130, 171, 207, 245, 265, 285 and 305.

KENNEDY CREEK NEAR BABB, MONT.

This station is about one and one-half miles above the mouth of Kennedy Creek, and four miles north of Babb. No observer could be obtained, and we have for most years the occasional discharge measurements of the hydrographers. During 1905 members of the U. S. Geological Survey made sufficient gage height observations to afford a basis for estimating the flow.

Elevation of Station, 4,500 feet.
Elevation of Head Waters, 8,000 feet.
Drainage Area, 50 square miles.
Character of Basin: Forested mountains.

Month.	Discharge in Second Feet		Run-off	
	Mean	Per Sq. Mile	Total Acre Feet	Depth in Inches on Drainage Area
Estimated Monthly Flow for the Year of 1905:				
January	10	0.200	615	0.23
February	10	.200	555	.21
March	30	.600	1,840	.69
April	75	1.50	4,460	1.67
May	100	2.00	6,150	2.31
June	320	6.40	19,000	7.14
July	203	4.06	12,500	4.68
August	58	1.17	3,590	1.35
September	31	.614	1,830	.68
October	30	.600	1,840	.69
November	30	.600	1,780	.67
Total Recorded	..	....	54,200	20.32

The following measurements have been made of Kennedy Creek in other years:

Nov. 5, 1901—Discharge ..... 55 second-feet.
July 25, 1903—Discharge .....208 second-feet.
Aug. 1, 1903—Discharge .....164 second-feet.
Aug. 8, 1903—Discharge .....136 second-feet.
Aug. 15, 1903—Discharge .....138 second-feet.
Aug. 22, 1903—Discharge .....114 second-feet.
Oct. 3, 1903—Discharge .....102 second-feet.
Oct. 10, 1903—Discharge ..... 84 second-feet.
Oct. 17, 1903—Discharge ..... 91 second-feet.
March 31, 1906—Discharge .... 28.7 second-feet.
Aug. 18, 1906—Discharge ..... 49.4 second-feet.
Sept. 14, 1906—Discharge ..... 66.4 second-feet.
May 14, 1907—Discharge .....240 second-feet.
June 6, 1907—Discharge .....979 second-feet.
July 2, 1907—Discharge ... .919 second-feet.
Aug. 8, 1907—Discharge ... .152 second-feet.
Sept. 7, 1907—Discharge ..... 87 second-feet.

References: U. S. G. S. Water Supply Papers Nos. 66, 100, 130, 171, 207, 245.

SWIFTCURRENT CREEK NEAR BABB, MONTANA.

This station is about one mile from the mouth of the stream, and two miles south of Babb. It has been called at different times Swiftcurrent Creek near Wetzel, and Swiftcurrent Creek near St. Mary.

Established in 1902.

Elevation of Station, 4,500 feet.

Elevation of Head Waters, 7,500 feet.

Drainage Area, 101 square miles.

Character of Drainage Basin: Forested mountains; stream fed by glaciers.

Month.	Discharge in Second-feet.				Run-off.	
	Maximum	Minimum	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
Monthly Flow for the Year of 1902:						
April	.....	.....	109	1.08	6,480	**1.20**
May	1,966	156	989	9.79	60,800	11.30
June	1,799	245	880	8.71	52,400	9.71
July	2,909	301	836	8.28	51,400	9.55
August	412	190	276	2.73	17,000	3.15
September	412	108	168	1.66	10,000	1.85
October	128	78	106	1.05	6,520	1.21
November	78	58	66	.65	3,930	**.73**
Total Recorded	.....	.....	.....	.....	208,000	.....
Monthly Flow for the Year of 1903:						
January	67	45	50	.50	3,070	.58
February	52	45	46	.46	2,560	.48
March	78	45	50	.50	3,070	.58
April	325	40	100	.99	5,950	1.10
May	1,180	162	465	4.60	28,600	5.30
June	2,630	1,180	1,885	18.66	112,000	20.82
July	1,105	420	708	7.01	43,500	8.08
August	475	325	389	3.85	23,900	4.44
September	1,340	190	421	4.17	25,000	4.65
October	535	190	277	2.74	17,000	**3.16**
November	740	112	256	2.53	15,200	**2.82**
December	219	136	166	1.64	10,200	1.89
Total Recorded	2,630	40	401	3.97	290,000	53.90
Monthly Flow for the Year of 1904:						
January—a	.....	.....	50	.50	3,070	.58
February—a	.....	.....	40	.40	2,300	**.43**
March—a	.....	.....	40	.40	2,460	.46
April	810	60	280	2.77	16,700	3.09
May	1,500	420	749	7.42	46,000	**8.55**
June	1,540	568	972	9.62	57,800	10.73
July	845	348	553	5.48	34,000	**6.32**
August	348	176	290	2.87	17,800	3.31
September	234	80	128	1.27	7,620	1.42
October	101	20	62	.61	3,810	**.70**
November	90	17	36	.36	2,140	.40
December	36	17	23	.23	1,410	**.26**
Total Recorded	1,540	17	269	2.66	195,000	36.25
Monthly Flow for the Year of 1905:						
January—a	.....	.....	20	.198	1,230	.23
February—a	.....	.....	20	.198	1,110	.21
March	160	18	64	.638	3,960	.74
April	665	18	147	1.46	8,450	1.63
May	730	225	433	4.29	26,600	4.95
June	1,255	435	781	7.73	46,500	8.62
July	665	340	483	4.78	29,700	5.51
August	340	130	242	2.40	14,900	2.77
September	130	44	98	.969	5,820	1.08
October	665	130	276	2.73	17,000	3.15
November—a	130	44	66	.658	3,960	.734
December—a	.....	.....	50	.495	3,070	.571
Total Recorded	1,255	18	223	2.21	162,000	30.18
Monthly Flow for the Year of 1906:						
January—a	.....	.....	30	.297	1,840	**.34**
February—a	.....	.....	30	.297	1,670	.31
March—a	60	7	29.5	.292	1,810	.34
April	600	60	299	2.96	17,800	**3.30**

SWIFTCURRENT CREEK NEAR BABB, MONTANA—(Continued).

Month.	Discharge in Second Feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
May	730	385	500	4.95	30,700	5.71
June	1,020	485	623	6.17	37,100	6.88
July	540	225	381	3.77	23,400	4.35
August	300	160	220	2.18	15,500	2.51
September	260	80	151	1.50	8,980	1.67
October	875	130	347	3.44	21,300	3.97
November	485	190	308	3.05	18,300	3.40
December	190	7	55.5	.550	3,410	.63
Total Recorded	1,020	7	248	2.45	180,000	33.41
Monthly Flow for the Year of 1907:						
January—a	.....	.....	50	.495	3,070	.57
February—a	.....	.....	65	.644	3,610	.67
March—a	.....	.....	50	.495	3,070	.57
April	244	90	171	1.69	10,200	1.89
May	1,520	166	713	7.06	43,800	8.14
June	1,840	800	1,510	15.0	89,800	16.69
July	1,320	415	912	9.03	56,100	10.41
August	590	242	387	3.83	23,800	4.42
September	470	321	387	3.83	23,000	4.27
October	280	82	157	1.55	9,650	1.79
November	82	51	61.1	.605	3,640	.68
December	51	29	41.3	.409	2,540	.47
Total Recorded	1,840	.....	375	3.72	272,000	50.57
Monthly Flow for the Year of 1908:						
January—a	.....	.....	15	.149	922	.17
February—a	.....	.....	25	.248	1,440	.27
March—a	.....	.....	50	.495	3,070	.57
April	880	39	333	3.30	19,800	3.68
May	1,220	530	821	8.13	50,500	9.37
June—b	.....	1,570	1,940	19.2	115,000	21.42
July—c	730	260	547	5.42	33,600	6.25
August	239	118	171	1.69	10,500	1.95
September	149	80	118	1.17	7,020	1.30
October	551	97	208	2.06	12,800	2.38
November	165	35	91.9	.910	5,470	1.02
December—a	.....	.....	18	.178	1,110	.21
Total Recorded	.....	.....	362	3.58	261,000	48.59
Monthly Flow for the Year of 1909:						
April	410	85	119	1.18	7,080	1.32
May	1,890	178	764	7.56	47,000	8.72
June	3,360	1,340	2,120	21.0	126,000	23.43
July	2,070	95	783	7.75	48,100	8.94
August	1,780	250	476	4.71	29,300	5.43
September	270	95	170	1.68	10,100	1.87
October	145	78	96.7	.957	5,950	1.10
November, 1–23	410	70	140	1.39	6,390	1.19
Total Recorded	3,360	.....	.....	.....	280,000	.....
Monthly Flow for the Year of 1910:						
January—a	.....	.....	50	.495	3,070	.57
February—a	.....	.....	55	.545	3,060	.57
March—a	340	.....	143	1.41	8,790	1.63
April	1,030	130	452	4.47	26,900	4.99
May, 1–13	1,140	340	659	6.52	16,900	3.15
Total Recorded	.....	.....	.....	.....	58,700	.....
Mean Monthly Flow for the Period of Record:						
January	.....	.....	37.9	.376	2,330	.43
February	.....	.....	40.1	.397	2,230	.41
March	340	7	60.9	.603	3,740	.70
April	1,030	18	223	2.21	13,300	2.47
May	1,966	156	679	6.72	41,800	7.75
June	3,360	245	1,340	13.26	79,700	14.80
July	2,909	95	650	6.44	40,000	7.42
August	1,780	118	306	3.03	18,800	3.49

SWIFTCURRENT CREEK NEAR BABB, MONTANA—(Continued).

Month.	Discharge in Second-feet.				Run-off.	
	Max'm	Min'm	Mean	Per Sq. Mile	Total Acre Ft.	Depth in Inches on Drainage Area
September	1,340	44	205	2.03	12,200	2.26
October	875	20	191	1.89	11,700	2.18
November	740	17	128	1.27	7,620	1.42
December	219	7	59	.584	3,590	.67
Mean Yearly	3,360	7	327	3.23	237,000	44.00

a—Estimated for frozen period.
b—Obtained by using same run-off per square mile as St, Mary River.
c—July 1 to 25, 1908 obtained from comparative hydrographs of the three stations in this vicinity.
Note—Measurements on October 9 and October 30, 1901, showed discharges of 188 and 123 second-feet.
Reference for daily flow in U. S. G. S. Water Supply papers Nos. 66, 85, 100, 130, 171, 207, 245, 265 and 285.

MISCELLANEOUS MEASUREMENTS IN ST. MARY RIVER DRAINAGE BASIN IN MONTANA.

Date.	Stream.	Tributary To—	Locality.	Discharge Sec.-ft.
Aug. 3, 1903	Boundary Creek	St Mary River	One-quarter mile above mouth	29
Oct. 5, 1903	.....do.....	.....do.....	.....do.....	18
July 18, 1903	Boulder Creek	Swiftcurrent Creek	Fifty yds., above mouth	140

INDEX TO STREAM-FLOW DATA IN REPORTS OF THE U. S. GEOLOGICAL SURVEY.

Prior to 1902 the results of stream measurements were not published by drainage basins, giving complete annual results for each basin in one paper, but appeared in various reports as shown in the following table:

(Ann. = Annual Report; B = Bulletin; W. S. = Water Supply Paper.)

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept. 1890.
12th Ann., pt. 2	.....do	1884 to June 30, 1891
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Description, measurements, gage heights, and ratings	1893 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years)	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas	1897.
W. S. 16	Description, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States	1897.
19th Ann., pt. 4	Description, measurements, ratings, and monthly discharge (also some long-time records)	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States	1898.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.

After 1901 the data has been published in Water Supply Papers according to drainage basins as shown in the following list for the drainage basins which include parts of Montana.

Year.	Numbers of Water-Supply Papers.		
	Missouri River Drainage.	Columbia River Drainage.	Hudson Bay Drainage.
1902	84	85	85
1903	99	100	100
1904	130	135	130
1905	172	178	171
1906	208	214	207
1907–8	246	252	245
1909	266	272	265
1910	286	292	285
1911	306	312	305

Note—Missouri River drainage includes Missouri River, Yellowstone River and Little Missouri River. Columbia River drainage includes Clark Fork of Columbia River and Kootenai River. Hudson Bay drainage includes St. Mary River.

Water Supply Paper 119 contains an index of records prior to 1904.

PRECIPITATION TABLES.

In the following tables on precipitation are given, for various stations in Montana, rainfall data obtained from the reports of the U. S. Weather Bureau. The first table gives, so far as available, the name of the station, the county in which it is situated, its elevation, the first and last years recorded, the actual number of years recorded, the normal, maximum and minimum annual precipitation, the tributary basin, and the main drainage basin in which each station is located. In obtaining the normal annual precipitation the mean precipitation for each month has first been computed and the sum of the twelve monthly means equals the normal annual precipitation.

In the second table the weather stations are listed according to drainage basins and tributary basins, enabling a person who desires rainfall data in any particular drainage area to tell at once at what points records are available.

U. S. WEATHER REPORTS ON ANNUAL PRECIPITATION FOR MONTANA.

Station.	County.	Elevation—Feet.	Record. From	Record. To	Number of Years Recorded	Precipitation—Inches. Normal	Maximum	Minimum	Tributary Basin.	Drainage Basin.
Adams	Dawson	.....	1905	1910	5	17.9	28.98	9.20	Yellowstone	Yellowstone.
Adel	Cascade	5,200	1898	1911	14	21.2	31.72	11.63	Smith	Missouri.
a Agricultural College.	Gallatin (Bozeman)	4,700	1868	1911	32	18.7	32.63	14.18	Gallatin	Missouri.
Anaconda	Deer Lodge	5,300	1894 / 1901	1911	10	13.5	18.89	9.03	Clark Fork	Clark Fork.
Augusta	Lewis and Clark	4,071	1896 / 1901	1898 / 1911	13	16.2	23.46	7.13	Sun	Missouri.
Babb	Teton	4,461	1906	1911	6	22.3	27.10	17.98	St. Mary	St. Mary.
Bald Butte	Lewis and Clark	6,500	1910	1911	2	20.2	.....	.....	Missouri	Missouri.
Big Timber	Sweet Grass	4,072	1894	1911	6	14.7	.....	.....	Yellowstone	Yellowstone.
Billings	Yellowstone	3,115	1883	1911	12	14.2	16.89	10.93	Yellowstone	Yellowstone.
Bison Mountain	Powell	7,240	1909	1911	2	25.4	.....	.....	Little Blackfoot	Clark Fork.
b Blackleaf	Teton	4,260	1905	1911	7	18.3	28.70	13.43	Marias	Missouri.
Boulder	Jefferson	4,920	1891	1910	15	11.1	12.10	6.23	Jefferson	Missouri.
Bowen	Beaverhead	6,060	1906	1911	5	14.4	18.56	10.10	Jefferson	Missouri.
Bridger	Carbon	3,664	1909	1911	3	8.7	10.10	7.82	Clark Fork	Yellowstone.
Broadview Ex. Sta.	Yellowstone	.....	1909	1911	3	12.9	14.20	12.62	Musselshell	Missouri.
Busby	Rosebud	.....	1903	1911	8	14.3	.....	.....	Yellowstone	Yellowstone.
Busteed	Sweet Grass	.....	1909	1911	3	13.9	14.69	12.98	Yellowstone	Yellowstone.
Butte	Silver Bow	5,716	1894	1911	17	13.8	20.55	6.95	Clark Fork	Clark Fork.
Cabin Creek	Beaverhead	.....	1909	1911	2	9.3	.....	.....	Jefferson	Missouri.
Canyon Ferry	Lewis and Clark	3,644	1899	1911	13	12.4	16.35	**7.69**	Missouri	Missouri.
Cascade	Cascade	3,361	1904	1911	7	18.2	26.23	14.01	Missouri	Missouri.
Castle	Meagher	5,800	1897	1899	3	20.2	20.62	16.81	Musselshell	Missouri.
Chessman Reservoir	Lewis and Clark	5,275	1909	1911	3	22.0	23.99	18.90	Missouri	Missouri.
Chester	Hill	3,140	1900 / 1911	1909 /	8	10.6	15.96	6.90	Marias	Missouri.
Chinook	Blaine	2,502	1896	1911	14	12.6	.....	.....	Milk	Missouri.
Chouteau	Teton	3,810	1890 / 1905	1898 / 1909	12	15.2	18.73	8.39	Marias	Missouri.
Clearcreek	Blaine	.....	1905	1911	6	18.3	24.74	.....	Milk	Missouri.
c Clemons	Lewis and Clark	4,672	1892	1911	11	18.8	27.18	12.77	Dearborn	Missouri.
Clydepark	Park	.....	1911	....	1	13.6	.....	.....	Shields	Yellowstone.
Cokedale	Park	5,750	1892	1897	4	24.4	31.59	22.57	Yellowstone	Yellowstone.
Columbia Falls	Flathead	3,100	1894	1911	17	22.9	31.24	15.22	Flathead	Clark Fork.
Como	Ravalli	3,700	1908	1911	4	16.5	19.31	15.86	Biterroot	Clark Fork.
Copper	Meagher	5,800	1905	1911	7	18.1	19.77	15.33	Musselshell	Missouri.
Crow Agency	Rosebud	3,041	1879	1911	31	14.6	20.28	8.03	Bighorn	Yellowstone.
Culbertson	Valley	1,927	1901	1911	9	13.5	22.43	9.24	Missouri	Missouri.
Custer Station	Yellowstone	2,749	1888	1891	3	15.4	.....	1.78	Yellowstone	Yellowstone.
d Cut Bank	Teton	3,700	1894	1911	13	16.7	26.28	6.07	Marias	Missouri.
Darby	Ravalli	3,825	1909	....	1	21.9	.....	.....	Bitterroot	Clark Fork.

U. S. WEATHER REPORTS ON ANNUAL PRECIPITATION FOR MONTANA—(Continued).

Station.	County.	Elevation—Feet.	Record. From.	Record. To.	Number of Years Recorded.	Precipitation—Inches. Normal.	Maximum.	Minimum.	Tributary Basin.	Drainage Basin.
Dayton	Flathead	2,800	1903	1910	6	15.2	18.47	14.60	Flathead	Clark Fork.
Decker	Rosebud	3,400	1905	1910	6	12.6	15.65	11.50	Tongue	Yellowstone.
Deer Lodge	Powell	4,768	1870	1906	12	11.9	.....	.....	Clark Fork	Clark Fork.
Dell	Beaverhead	6,014	1899	1902	3	6.9	7.96	5.53	Jefferson	Missouri.
Denton	Fergus	3,500	1908	1911	3	16.7	.....	.....	Judith	Missouri.
Dillon	Beaverhead	5,147	1898	1911	14	17.4	22.68	11.51	Jefferson	Missouri.
Dirty Creek	Meagher	6,000	1909	1911	3	19.7	.....	14.55	Musselshell	Missouri.
Dry Creek	Broadwater	5,500	1909	1911	3	25.5	.....	.....	Missouri	Missouri.
Dry Wolf Camp	Cascade	6,000	1909	1911	3	24.1	.....	.....	Missouri	Missouri.
East Anaconda	Deer Lodge	5,500	1905	1911	6	15.8	19.11	12.55	Clark Fork	Clark Fork.
Ekalaka	Custer	.....	1897	1911	10	13.5	.....	.....	Little Missouri	Little Missouri.
Elkhorn	Jefferson	6,576	1909	1911	3	18.5	.....	.....	Jefferson	Missouri.
Erickson	Custer	.....	1906	1908	3	18.6	20.73	.....	Little Missouri	Little Missouri.
Evans	Cascade	4,900	1906	1911	4	38.1	.....	.....	Missouri	Missouri.
Fallon	Custer	2,208	1905	1911	7	12.0	15.71	8.30	Yellowstone	Yellowstone.
Family	Teton	3,950	1910	....	1	7.5	.....	.....	Marias	Missouri.
Fish Creek	Silver Bow	8,500	1909	1911	2	23.4	.....	.....	Jefferson	Missouri.
Flathead Creek	Gallatin	6,000	1909	1911	2	26.6	.....	.....	Shields	Yellowstone.
Forsyth	Rosebud	2,514	1904	1911	6	12.7	15.98	8.12	Yellowstone	Yellowstone.
Fort Benton	Chouteau	2,630	1869	1911	32	13.4	21.10	7.27	Missouri	Missouri.
a Fort Ellis	Gallatin	4,878	1868	1886	13	21.1	32.63	15.56	Gallatin	Missouri.
Fortine	Flathead	2,975	1906	1911	6	17.8	19.44	14.12	Tobacco	Kootenai.
e Fort Keough— (See Miles City)	Custer	2,350	....	1899	22	12.1	.....	.....	Yellowstone	Yellowstone.
Fort Logan	Meagher	6,000	1870 / 1889	1880 / 1908	23	13.0	19.40	7.32	Smith	Missouri.
Fort Maginnis	Fergus	4,340	1882	1890	8	16.5	26.00	9.00	Musselshell	Missouri.
Fort Shaw	Cascade	3,500	1868 / 1907	1886 / 1911	23	10.8	16.14	4.24	Sun	Missouri.
Fort Sheridan	Dawson	2,500	1874	....	1	27.9	.....	.....	.....	
Foster	Yellowstone	3,214	1909	1911	2	10.3	.....	.....	Yellowstone	Yellowstone.
Garneil	Fergus	5,500	1909	1911	3	30.7	38.55	26.42	Judith	Missouri.
Glasgow	Valley	2,080	1894	1911	15	12.6	20.20	9.41	Milk	Missouri.
Glendive	Dawson	2,069	1889	1911	22	15.6	22.51	9.90	Yellowstone	Yellowstone.
Glenwood	Broadwater	4,200	1897	1901	4	16.5	18.01	13.77	Missouri	Missouri.
Goldbutte	Hill	.....	1905	1911	7	16.0	24.17	7.39	Marias	Missouri.
Graham	Custer	.....	1905	1911	6	14.6	.....	.....	Powder	Yellowstone.
Grayling	Gallatin	6,700	1904	1911	7	15.0	.....	.....	Madison	Missouri.
Great Falls	Cascade	3,350	1892	1911	20	15.0	23.73	6.68	Missouri	Missouri.
Half Moon Pass	Fergus	6,500	1909	1911	2	38.0	.....	.....	Musselshell	Missouri.
Half Way House	Broadwater	6,000	1909	1911	2	26.6	.....	.....	Missouri	Missouri.
Hamilton	Ravalli	3,575	1898	1911	13	11.5	16.58	5.26	Bitterroot	Clark Fork.

Station.	County.	Elevation—Feet	Record. From	Record. To	Number of Years Recorded	Precipitation—Inches. Normal	Maximum	Minimum	Tributary Basin.	Drainage Basin
f Harlowton	Meagher	4,165	1891	1911	17	15.2	21.89	.....	Musselshell	Missouri.
Hat Creek	Powell	6,000	1909	1911	2	22.9	.....	.....	Clark Fork	Clark Fork.
Havre	Hill	2,505	1880	1911	32	13.7	25.67	6.76	Milk	Missouri.
g Hedges (See Yale)	Meagher	.....	....	....	..	....	.....	....	Musselshell	Missouri.
Helena	Lewis and Clark	4,110	1880	1911	32	12.8	19.94	6.71	Missouri	Missouri.
Highwood	Chouteau	.....	1905	1911	5	23.7	.....	.....	Missouri	Missouri.
e Hogan (See Clemons)	Lewis and Clark	4,590	1893	1901	8	18.2	27.18	13.16	Dearborn	Missouri.
Homepark	Madison	.....	1905	1910	6	14.4	19.65	12.45	Jefferson	Missouri.
Huntley	Yellowstone	3,014	1906	1911	6	13.0	14.33	12.03	Yellowstone	Yellowstone.
Jones Canyon	Gallatin	6,800	1909	1911	3	31.1	.....	.....	.....	Missouri.
Jordan	Dawson	.....	1905	1911	6	10.7	15.13	.....	Missouri	Missouri.
Kalispell	Flathead	2,965	1896	1911	15	16.9	19.50	10.85	Flathead	Clark Fork.
d Kipp	Teton	4,472	....	1899	6	20.2	.....	.....	.....	
Lewiston	Fergus	4,010	1896	1911	14	19.9	24.17	13.52	Judith	Missouri.
Libby	Lincoln	.....	1895	1897	2	17.8	.....	.....	Kootenai	Kootenai.
Livingston	Park	4,488	1895	1911	15	14.4	19.96	10.68	Yellowstone	Yellowstone.
Lodgegrass	Rosebud	3,441	1904	1907	4	12.9	.....	.....	Bighorn	Yellowstone.
Lonetree	Chouteau	3,280	1905	1911	7	19.8	27.78	.....	Missouri	Missouri.
Lost Creek	Deer Lodge	5,200	1910	1911	2	13.7	.....	.....	Jefferson	Missouri.
Lubec	Teton	5,046	1908	....	1	29.1	.....	.....	Marias	Missouri.
Malta	Valley	2,240	1905	1911	5	13.6	18.28	6.32	Milk	Missouri.
Manhattan	Gallatin	4,292	1895	1903	8	8.8	10.66	6.24	Gallatin	Missouri.
f Martinsdale	Meagher	.....	....	....	..	....	.....	.....	Musselshell	Missouri.
Marysville	Lewis and Clark	5,360	1894	1907	13	19.5	30.10	13.10	Missouri	Missouri.
Medicine Lake	Valley	.....	1911	....	1	17.0	.....	.....	Missouri	Missouri.
Melstone	Musselshell	2,897	1909	1911	2	14.2	.....	.....	Musselshell	Missouri.
Mildred	Custer	.....	1909	1911	3	14.9	.....	.....	Yellowstone	Yellowstone.
e Miles City	Custer	2,371	1877	1911	34	13.2	22.75	9.07	Yellowstone	Yellowstone.
Missoula	Missoula	3,212	1871	1911	33	15.7	22.43	8.76	Clark Fork	Clark Fork.
Moore	Fergus	4,180	1909	1911	2	18.9	.....	.....	Judith	Missouri.
New Chicago	Granite	4,540	1882	.....	1	18.4	.....	.....	Clark Fork	Clark Fork.
Norris	Madison	4,845	1909	1911	3	19.1	24.05	15.51	Madison	Missouri.
Nye	Sweet Grass	.....	1895	1911	7	22.0	26.59	17.76	Stillwater	Yellowstone.
Olsen Creek	Jefferson	6,345	1909	1911	3	18.0	.....	16.95	.....	Missouri.
Ophir	Powell	8,800	1909	1911	3	19.8	.....	.....	Little Blackfoot	Clark Fork.
Ovando	Powell	2,207	1899	1911	12	19.5	22.65	11.20	Big Blackfoot	Clark Fork.
Phillipsburg	Granite	5,275	1904	1911	8	15.5	19.97	7.29	Clark Fork	Clark Fork.
Piegan	Teton	6,000	1879	....	1	21.5	.....	.....	Marias	Missouri.
Pipestone Pass	Jefferson	7,000	1909	1911	3	18.6	.....	.....	Jefferson	Missouri.
Plains	Sanders	2,475	1898	1911	13	12.7	17.84	7.07	Clark Fork	Clark Fork.
Pleasant Valley	Flathead	3,500	1907	1911	4	19.2	22.37	16.90	Fisher	Kootenai.
Polson	Flathead	2,920	1907	1911	4	14.7	.....	.....	Flathead	Clark Fork.

U. S. WEATHER REPORTS ON ANNUAL PRECIPITATION FOR MONTANA—(Continued).

Station.	County.	Elevation—Feet.	Record. From.	Record. To.	Number of Years Recorded.	Precipitation—Inches. Normal.	Maximum.	Minimum.	Tributary Basin.	Drainage Basin.
Poplar	Valley	2,020	1882	1911	27	13.5	25.35	7.41	Missouri	Missouri.
b Raymond—										
(See Blackleaf)	Teton	.....	....	....	..	....	.....	.....	Marias	Missouri.
Red Lodge	Carbon	5,548	1894	1911	12	20.6	26.50	15.53	Clarke Fork	Yellowstone.
Renova	Jefferson	4,383	1898	1911	13	11.8	16.83	7.95	Jefferson	Missouri.
Ridgelawn	Dawson	1,915	1900	1907	7	15.6	.....	.....	Yellowstone	Yellowstone.
Rimini	Lewis and Clarke	7,900	1909	....	1	25.6	.....	.....	Missouri	Missouri.
Ryegate	Musselshell	3,640	1909	1911	3	17.8	.....	.....	Musselshell	Missouri.
Saltese	Missoula	3,600	1905	1911	7	34.7	44.80	21.79	Clark Fork	Clark Fork.
Snowshoe	Lincoln	4,500	1907	1911	5	66.6	79.95	.....	Kootenai	Kootenai.
Springbrook	Dawson	.....	1902	1911	10	20.5	25.01	13.50	Missouri	Missouri.
Stearns	Lewis and Clark	4,500	1909	1911	2	21.3	24.63	15.42	Dearborn	Missouri.
St Ignatius	Missoula	2,700	1909	1911	6	15.6	.....	.....	Flathead	Clark Fork.
St. Paul's	Blaine	4,150	1896	1906	9	15.3	17.55	9.88	Milk	Missouri.
St. Peter	Cascade	4,500	1901	1906	6	18.9	22.31	9.49	Missouri	Missouri.
St. Regis	Missoula	2,650	1908	1911	3	22.6	.....	.....	Clark Fork	Clark Fork.
Terry's Landing	Custer	2,264	1881	1883	2	8.5	.....	.....	Yellowstone	Yellowstone.
Tokna	Dawson	2,050	1906	1911	6	16.6	27.08	.....	Yellowstone	Yellowstone.
Toston	Broadwater	3,950	1894	1909	12	10.5	.....	.....	Missouri	Missouri.
Trail Creek	Park	6,000	1909	1911	3	23.9	.....	.....	Yellowstone	Yellowstone.
Troy	Lincoln	1,880	1895	1910	16	25.6	32.03	16.92	Kootenai	Kootenai.
Twin Bridges	Madison	4,627	1902	1907	3	8.5	.....	.....	Jefferson	Missouri
f Two Dot	Meagher	.....	....	....	..	....	.....	.....	Musselshell	Missouri.
Upper Lake McDonald	Flathead	3,200	1906	1910	4	30.7	.....	.....	Flathead	Clark Fork.
Utica	Fergus	5,000	1894	1911	18	16.4	24.16	10.42	Judith	Missouri.
Valentine	Fergus	.....	1907	1911	5	12.4	17.14	10.16	Musselshell	Missouri.
Valier	Teton	.....	*1911	*1911	..	9.0	.....	.....	Marias	Missouri.
Virginia City	Madison	5,880	1871	1911	23	15.2	19.47	7.08	Jefferson	Missouri.
Wall Rock Mountain	Broadwater	.....	1909	1911	3	17.4	.....	.....	Missouri	Missouri.
Warm Springs Creek	Madison	7,500	1909	1911	2	18.9	.....	.....	Madison	Missouri.
Warrick	Chouteau	.....	1905	1907	2	21.5	29.38	12.21	Missouri	Missouri.
White Sulphur Springs	Meagher	5,000	1894	1896	2	11.0	.....	8.86	Smith	Missouri.
Wibaux	Dawson	2,674	1893	1906	8	14.2	.....	...	Little Missouri	Little Missouri.
Wolf Creek	Lewis and Clark	4,000	1903	1911	8	14.0	.....	7.55	Missouri	Missouri.
Woodville	Jefferson	6,376	1892	1911	3	17.2	.....	....	Jefferson	Missouri.
g Yale (or Hedges)	Meagher	4.042	1895	1906	12	12.8	16.19	8.90	Musselshell	Missouri.

*The record for Valier is for 5 months from Aug. to Dec. inclusive.
a—Agricultural College combined with Fort Ellis 1868-1886.
b—Blackleaf. was formerly called Raymond.
c—Clemons combined with Hogan and Dearborn Canyon.
d—Cutbank combined with Kipp.
e—Miles City combined with Fort Keough.
f—Harlowton combined with Martinsdale and Two Dot.
g—Hedges and Yale are the same.

U. S. WEATHER STATIONS.

Located By Drainage Basins.

Drainage Basin.	Tributary Basin.	Weather Stations.
Clark Fork of Columbia.	Big Blackfoot	Ovando.
	Bitterroot	Como, Darby, Hamilton.
	Clark Fork	Anaconda, Butte, Deer Lodge, East Anaconda, Hat Creek, Missoula, New Chicago, Phillipsburg, Plains, Saltese, St. Regis.
	Little Blackfoot ...	Bison Mountain, Ophir.
	Flathead	Columbia Falls, Dayton, Kalispell, Polson, St. Ignatius, Upper Lake McDonald.
Kootenai	Fisher	Pleasant Valley.
	Kootenai	Libby, Snowshoe, Troy.
	Tobacco	Fortine.
Little Missouri	Little Missouri	Ekalaka, Ericson, Wibaux.
Missouri	Dearborn	Clemons, Hogan, Stearns.
	Gallatin	Agricultural College, Fort Ellis, Manhattan.
	Jefferson	Boulder, Bowen, Cabin Creek, Dell, Dillon, Elkhorn, Fish Creek, Homepark, Lost Creek, Olsen Creek, Pipestone Pass, Renova, Twin Bridges, Virginia City, Woodville.
	Judith	Denton, Garniel, Lewistown, Moore, Utica.
	Madison	Grayling, Norris, Warm Springs Creek.
	Marias	Blackleaf (formerly Raymond), Chester, Chouteau, Cutbank, Family, Goldbutte, Lubec, Piegan, Valier.
	Milk	Chinook, Clearcreek, Glasgow, Havre, Malta, St. Pauls.
	Missouri	Bald Butte, Canyon Ferry, Cascade, Chessman Reservoir, Culbertson, Dry Creek, Dry Wolf Camp, Evans, Fort Benton, Glenwood, Great Falls, Half Way Pass, Helena, Highwood, James Canyon, Jordan, Lonetree, Marysville, Poplar, Rimini, St. Peter, Springbrook, Toston, Wall Rock Mountain, Warrick, Wolf Creek.
	Musselshell	Broadview, Castle, Copper, Dirty Creek, Fort Maginnis, Half Moon Pass, Harlowton, Melstone, Ryegate, Valentine, Yale (Hedges)
	Smith	Adel, Fort Logan, White Sulphur Springs.
	Sun	Augusta, Fort Shaw.
St. Mary	St. Mary	Babb.
Yellowstone	Bighorn	Crow Agency, Lodgegrass.
	Clarke Fork	Bridger, Red Lodge.
	Powder	Graham.
	Shields	Clyde Park, Flathead Creek.
	Stillwater	Nye.
	Tongue	Decker.
	Yellowstone	Adams, Big Timber, Billings, Busby, Busteed, Cokedale, Custer, Fallon, Foster, Forsyth, Glendive, Huntley, Livingston, Mildred, Miles City, Ridgelawn, Terry's Landing, Tokna, Trail Creek.

RUN-OFF FROM MONTANA DRAINAGE BASINS.

In considering the question of run-off there are so many modifying factors involved that it is difficult to arrive at satisfactory conclusions. The relation of rainfall to run-off is very uncertain. In some cases the rainfall may be used for estimating the run-off, but it is only an approximation at best. One difficulty lies in the fact that while we have numerous records of precipitation for points in the valleys and on the plains of sufficient length to give a fairly good mean, there are comparatively few records available for stations in the higher mountainous districts where the greater part of the precipitation occurs.

As one example of these conditions the Bitterroot valley may be taken. Precipitation records of some length are available for Missoula and Hamilton, and shorter ones for Darby and Como. The mean precipitation for these places is 15.7, 11.5, 21.9, and 16.5 inches respectively, the record at Darby being for only one year. But the mean run-off over the drainage area above Grantsdale and Missoula, as determined by stream gagings for periods of 6 and 5 years, was 12.0 inches and 13.7 inches which does not include the water diverted and used for irrigation.

The St. Mary basin may be given as a more extreme example. The weather reports show a mean rainfall at Babb of 22.3 inches, while the run-off above Babb as determined by gagings averaged over 40 inches, and the run-off above the station near Cardston, Alberta, averaged more than 30 inches in depth over the entire drainage area.

It has been said that each stream and drainage basin is a law unto itself, and while this seems in general to be true, yet smaller adjacent tributaries of the same basin sometimes have conditions such that their run-off is comparatively uniform. Thus the St. Mary River near Babb has a mean run-off of 44.9 inches and Swiftcurrent Creek, near Babb, 44.0 inches for almost the same period. In the Marias basin, Two Medicine Creek near Family, Badger Creek near Family, and Birch Creek near Dupuyer show run-offs of 17.5, 15.7 and 14.6 inches for nearly the same periods. But great differences sometimes exist between basins not very far apart. For example, the North Fork of hte Musselshell River near Delpine gave a run-off of only 3.7 inches, while about 40 miles to the south in a different drainage basin, at a slightly greater elevation, the records of the Sweetgrass above Melville show a mean run-off of about 28 inches. The latter record contains one high year which the former lacks, but it was not high enough to account for much of the difference between the two. The drainage areas are nearly the same size, being 50 and 47 square miles. Both streams rise in the mountains where there is a little timber, both have an open region of rolling hills in the vicinity of the gaging station, and there is but little water diverted for irrigation above either station. There is no record of precipitation in the Sweetgrass basin, while Copper in the Musselshell has a mean rainfall of about 18 inches for a period of 7 years, and a mean of about 17 inches for the period of stream flow recod. The source of Sweetgrass Creek is on the northern slopes of the Crazy Mountains, and at an elevation between 9,000 and 10,000 feet, while the North Fork of the Musselshell rises on the southern slopes of the Little Belt Mountains at an elevation of about 8,000 feet. The greatest caution is therefore necessary in making comparisons.

The following tabulation is given as an example of the run-off in depth in inches on the drainage area for a few Montana streams, based upon the measured flow of the streams from drainage basins of known area.

RUN-OFF DATA FOR A FEW MONTANA DRAINAGE BASINS.

Station.	Record Years.....	No. of Years Recorded.	Run-off in Inches. Normal.....	Maximum.....	Minimum.....	Drainage Area—sq. mi.	Elevation in Feet. Station.....	Headwaters.....	Character of Drainage Basin.
(Clark Fork Columbia Drainage)									
Big Blackfoot River at Bonner ..	1898–1905	6	10.64	.....	.....	2,460	3,300	8,000	Forested mountains.
Bitterroot River near Grantsdale..	1902–1907	6	12.00	17.10	6.11	1,550	3,600	.....	Mountainous.
Bitterroot River near Missoula ..	1898–1904	5	13.72	.....	.....	3,260	.....	.....	Mountains and irrigated valley.
Flathead River near Columbia Falls.	1911	1	23.83	.....	.....	1,620	.....	.....	Densely forested mountains.
Flathead River near Polson	1907–1910	3½	24.36	.....	.....	6,770	.....	.....	Densely forested mountains and irrigated valley.
Flathead R., M. Fk., near Belton	1911	1	34.89	.....	.....	900	3,200	8,500	Densely forested mountains.
(Missouri Drainage).									
W. Gallatin River at mouth of Spanish Creek near Salesville	1889–1894	5	15.18	18.02	.....	850	5,300	10,000	Forested mountains.
W. Gallatin near Salesville	1895–1911	11	16.52	24.78	.....	860	5,200	10,000	Forested mountains.
Ford Creek near Augusta	1906–1911	6	23.36	36.82	15.34	18	4,800	7,000	Mountainous.
Smith Creek near Augusta	1906–1911	6	18.40	26.38	10.95	26	4,600	7,000	Mountainous—Possibly affected by underflow.
Two Medicine Creek near Family	1907–1911	5	17.51	.....	12.74	368	.....	.....	Mountains and rolling benchlands.
Badger Creek near Family	1907–1911	4	15.72	.....	.....	224	.....	.....	Mountains and rolling benchlands.
Birch Creek near Dupuyer	1907–1911	3½	14.55	.....	.....	155	.....	.....	Mountains and rolling benchlands.
N. Fk. Musselshell River near Delpine	1909–1911	2½	3.72	.....	2.73	50	5,400	8,000	Mountains and small irrigated meadows. Most of the run-off passes the station.
Checkerboard Creek near Delpine	1909–1911	2½	5.02	.....	3.81	23	5,500	7,000	Steep, rocky, partially forested mountains.
(Yellowstone Drainage).									
Yellowstone River at Horr	1889–1893	4	14.22	.....	.....	2,700	5,100	10,000	Forested mountains.
Yellowstone River at Livingston..	1897–1905	9	14.53	17.53	10.10	3,580	4,480	10,000	Forested mountains.
Sweetgrass Creek above Melville..	1907–1911	4	28.8	.....	.....	47	5,900	9,500	Mountains—Most of water passes the station.
(St. Mary Drainage).									
St. Mary River near Babb	1902–1911	10	44.91	57.10	32.53	177	4,500	8,000	Forested mountains. Streams fed by glaciers.
St. Mary River at Babb	1901–1911	3	37.85	.....	.....	298	4,400	8,000	Forested mountains. Streams fed by glaciers.
St. Mary River near Cardston, Alberta	1902–1911	9	30.99	45.92	19.55	452	4,200	8,000	Rolling prairies below Babb.
Swiftcurrent Creek near Babb ..	1902–1910	8	44.00	53.90	30.18	101	4,500	7,500	Same as St. Mary near Babb.

A REPORT ON EVAPORATION IN THE STATE OF MONTANA.

By L. F. Gieseker, Assistant Agronomist, Montana Experiment Station, Bozeman, Montana.

The loss of water by evaporation from free water surfaces on reservoirs and canals is an item the irrigationist must consider in determining the duty of water. The rapid development of irrigation in the state has called the engineer's attention to greater problems than that of evaporation. He has not had the time to work out the difficulties in measuring the loss, and continuing the work over a period of years to insure reliable data.

For the state of Montana we find no published reports bearing directly upon the subject of evaporation. What measurements have been made on canals and reservoirs with the object of determining the loss of water by evaporation are open to the criticism that the recorded results include the loss of water by seepage.

Since the subject has not been given consideration, we must turn our attention to the meteorologists, who have made a study not only of the factors governing evaporation but have made direct measurements of the loss of water by evaporation.

The evaporation measurements have been made from tanks placed in the ground in suitable locations for readings. The data collected in this manner may not directly apply to losses of water from reservoirs and canals but is sufficiently accurate to give a fair idea of the possible loss of water due to evaporation. The large area included in the state makes it impossible to consider the evaporation measurements made at any one point as representative of the state.

To obtain an idea of the conditions under which the evaporation measurements were taken and to compare these conditions with other states in which evaporation data has been collected, a brief description of the state and its climate will be given.

The state of Montana lies between the 104th and 116th meridian west from Greenwich and between the 45th and 49th parallels north latitude. It has an average length of 535 miles east and west and a width of 275 miles north and south. About one-third of its 93,860,080 acres is composed of mountains, the remaining about equally divided into grazing and farm lands. The altitude of the state as given by Prof. Garnett of the U. S. Geological Survey, is from 2,000 to 11,000 feet, with an average elevation of 3,900 feet. The annual rainfall is 15.5 inches of which 50 to 65 per cent comes in the growing months of April, May, June and July. The rainfall is not evenly distributed, varying from 10 to over 20 inches. The mean annual temperature is about 43 degrees, or about the same as for the state of New York. The wind velocity when compared with neighboring states is normal. The state is not subject to extremely high temperatures or hot winds. The relative humidity, because of its lower annual temperature, is

somewhat higher than states similarly located. The state, for considering is evaporation losses, may be conveniently divided into three sections: 1st, the area east of the mountains; 2nd, Inter-mountain area; 3rd, area lying west of the mountains.

It is unfortunate that there are no stations at which evaporation measurements have been taken in each of these sections. The points in the state at which evaporation data has been collected are at Bozeman and Moccasin. The former may be considered in the inter-mountain area and the latter in the area east of the mountains. For the area west of the mountains there are no stations at which evaporation measurements have been taken. In order to obtain an idea of the possible loss of water by evaporation in that area meteorological data must be compared.

Evaporation in Eastern Montana.

The part of the state included in this area runs from an altitude of 2,000 to 5,000 feet It is largely a rolling, treeless area broken in the southeastern part by the bad lands. It is subject to the general conditions that prevail over the Great Plains Region. This area covers about two-thirds of the state.

Because of the proximity of Williston, N. D., and Belle Fourche S. D., to the state line, the data collected at these points apply equally well to a large part of eastern Montana and will therefore be considered in this area. The location of the three stations at which evaporation data has been collected in this area are as follows: Moccasin, Montana; west central: Williston, northeast corner; Belle Fourche, southeast corner.

Following are tables of evaporation collected at each of these stations during the growing season for the time the work has been conducted.

TABLE I.

Moccasin, Montana. Elevation, 4160.

Month.	1909 (Inches)	1910 (Inches)	1911 (Inches)	1912 (Inches)	Average (Inches)
April	.112(1)	1.066(2)	4.097	.....	3.703
May	4.657	5,606	5.941	.....	5.401
June	5.997	7.208	5.130	(4)	6.112
July	7.220	8.235	7.312	.....	7.606
August	6.836	7.382	6.352	.....	6.857
September	4.895	3,888(3)	3.445	.....	4,940
Total amount recorded	29.72	33.43	32.28	.....	.....
Total for 6 months					34.619

(1)—2 days.
(2)—6 days.
(3)—18 days.
(4)—Data not at hand. Forwarded to Washington, D. C. J. M. Stevens reports evaporation for year 1912 about same as for year 1911.

TABLE II.

Williston, N. D. Elevation 1859. Recorder, E. G. Schollander.

Month.	1910 (Inches)	1911 (Inches)	1912 (Inches)	Average (Inches)
April	5.348	3.860	3.875	4.673
May	5.764	6.087	4.781	5.544
June	8.171	7.145	6.468	7.261
July	8.994	8.717	5.980	7.897
August	5.802	5.5584	4.993	5.459
September	3.910	3.445(1)	2.981	3.445
Total amount recorded	37.989	34.838	29.078	.....
Average				34.279

(1)—Not recorded. Average of Sept. 1910 and 1912.
(2)—20 days.

TABLE III.

Belle Fourche, S. D. Recorder: Beyer Aune.

Month.	1910 (Inches)	1911 (Inches)	1912 (Inches)	Average (Inches)
April	3.968	4.619	3.021	3.869
May	5.245	8.304	6.582	6,710
June	8.975	10.242	9.206	9.474
July	10.425	10.714	7.853	9.664
August	7.186	6.742	7.115	7.014
September	5.304	6.130	3.935	5.123
Total amount recorded	41.103	46.751	37.712	.....
Average				41.854

Average of the three stations for the three years is 36.95.

In several cases the tables do not show complete monthly readings, as for the case for April and September. The average for these months was obtained by finding the average loss per day and recalculating on this basis for the total loss of the month.

The evaporation measurements at each of these stations were made from tanks 8 feet in diameter and 2½ feet deep.

Inter-Mountain Area.

The area included in this section is composed chiefly of mountains. Many fertile valleys are found in this section, varying in altitude from 4,500 to over 6,000 feet. The climate of these valleys differs from other parts of the state because of the local factors governing conditions. In general these valleys receive a greater rainfall, less wind and a lower summer temperature than the area east of the mountains. The atmosphere is somewhat more humid. In this area at only one point—Bozeman—has a loss of water by evaporation been recorded. The work at Bozeman under Dr. Fortier in 1900 to 1903 and later by Mr. Buckman and the present writer, from 1908 to 1912, was planned with a different purpose in view than to collect evaporation data. It is for this reason the data from 1908 to 1912 is not complete. The tanks used from which the data was collected were not regulation size. From 1900 to 1903 a zinc lined box measuring 3 feet

along each side was used. In 1908 a tank 23½ inches in diameter and 4 feet deep was installed. The reading and height of water in tanks were similar to those at meteorological stations.

TABLE IV.

Bozeman, Montana. Elevation, 4,900.

Month.	1900	1901	1902	1903	1908	1909	1910	1911	1912	Av.
April	.....	0.89	2.11	....	....	.....	.....	....	.....	2.10
May	5.52	5.27	3.40	1.12	....	.....	.33f	....	.....	4.04
June	5.99	4.20	3.30	3.99	....	3.20b	4.87	2.57i	3.85l	4.36
July	3.59	4.34	4.07	3.90	....	1.66c	.84g	4.42	3.44	4.10
August	3.88	5.27	3.60	3.38	....	4.28d	6.08	3.18j	3.38	4.31
September	2.74	3.43	3.01	3.36	4.11a	4.26e	1.57h	.52k	2.08	3.43
October	.98	2.79	1.55	1.64	....	.....	.....	....	.....	1.74
Total recorded	22.70	26.17	21.04	17.39	....	.....	.....	....	.....	.....
Average										24.08

a—28 days.
b—20 days.
c—8 days.
d—24 days.
e—23 days.
f—3 days.
g—7 days.
h—14 days.
i—28 days.
j—29 days.
k—7 days.
l—23 days.

The foot notes refer to the number of days in each month continuous readings were made.

Area West of Mountains.

The area west of the mountains resembles more closely the inter-mountain area than the Great Plains area east of the mountains. The climate is more moderate than the others, being modified by Pacific slope conditions. The altitude runs as low as 1,900 feet. The country in general is rough, mountainous and heavily forested.

In this locality there is only one point at which complete meteorological data is taken. The data taken at Kalispell the writer considers local and not representative of the area. From the writer's observation in that section the amount of evaporation would be estimated at over 30 inches per year.

Summary.

The average amount of evaporation for the six growing months for the past three years in the Great Plains area of Montana is 36.95 inches.

The evaporation increases from the northern part of the state to the southern part.

The evaporation for the remaining six months may be conservatively estimated to bring the total annual amount up to 40 to 45 inches per year. The evaporation for the inter-mountain area is recorded 24.70 inches for 7 months at the point—Bozeman. This amount may be considered somewhat low for remaining portion of the inter-mountain area.

The area west of the mountains is estimated at over 30 inches per year.

An estimate of the average annual evaporation for state may be placed at about 40 inches per year.

EVAPORATION IN DIFFERENT STATES.

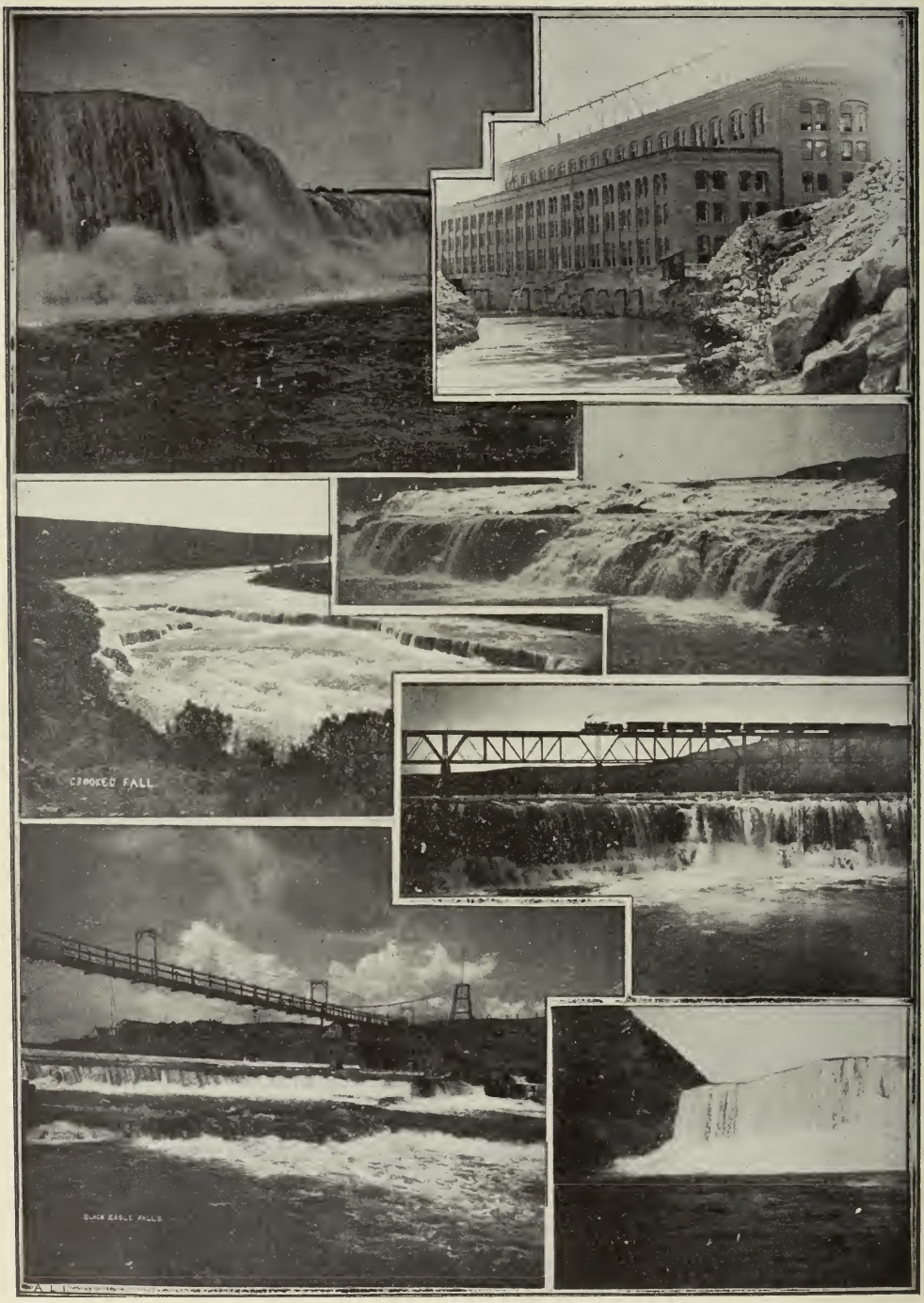
The following table shows the total evaporation which took place from tanks during the six months of irrigation period, and is copied from Bulletin No. 188, Bureau of Plant Industry, U. S. Department of Agriculture, issued November 5th, 1910. The figures were obtained from widely scattered sources, and the measurements were made with tanks of different sizes and exposed in different ways. The Montana measurement, however, was made under supervision of the Bureau.

Table of Evaporation From Tanks.

During the six summer months from April to September inclusive, at various points in the United States.

(The figures given represent the total number of inches evaporated during this period.)

State.	City or Town.	No. of Years.	Date.	Evaporation Inches.
Arizona	Tucson	3	1892-3-4	54.2
	Yuma	3	1903-4-7	56.0
California	Calexico	1	1903-4	71.8
	Kingsburg Bridge	4	1882-3-4-5	49.2
	Lakeport	2	1901-2	25.3
	Lake Tahoe	2	1900-1	21.1
	Pomona	1	1903-4	44.4
	Sweetwater	5	1889-90-91-92-97	39.00
	Tulare	1	1903-4	56.6
Colorado	Akron	2	1908-9	45.0
	Fort Collins	15	1887 to 1902	29.3
	Grand Valley	1	1901	36.5
	Rocky Ford	1	1901	61.6
Kansas	Hays	3	1907-8-9	45.2
	Garden City	2	1908-9	59.9
Massachusetts	Boston: Beacon Hill	....		25.8
	Chestnut Hill	....		28.6
Michigan	Detroit	4	1861 to 1864	32.1
	Monroe	5	1863 to 1867	30.9
	Thunder Bay	4	1862 to 1865	30.2
MONTANA	Judith Basin	1	1909	32.6
Nebraska	Lincoln	11	1899 to 1909	34.8
	North Platte	3	1907-8-9	41.3
Nevada	Fallon	2	1908-9	51.0
	Reno	2	1894-1900 Mean	39.9
New Jersey	New Brunswick	2	1900-1-2	29.5
New Mexico	Carlsbad	1	1899	54.6
	Las Cruces	3	1899-1900-1	40.1
New York	Rochester	5		26.7
North Dakota	Dickinson	3	1907-8-9	31.4
	Edgeley	3	1907-8-9	29.8
	Williston	1	1909	30.0
Ohio	Cleveland	6	1862 to 1867	24.6
South Dakota	Belle Fourche	2	1908-9	38.0
	Highmore	1	1907	33.7
Texas	Amarillo	3	1907-8-9	52.4
	Dalhart	2	1908-9	54.6
	San Antonio	3	1907-8-9	45.7
Utah	Corinne	1	1901	40.1
	Fort Douglas	3	1890-1-2	30.7
	Logan	1	1901	34.3
	Nephi	2	1908-9	42.0
Washington	Prosser	2	1900-1	27.6
Wisconsin	Milwaukee	5	1863 to 1867	26.9
	Stevens Point	2	1901-2	28.8
Wyoming	Laramie	7	1893 to 1898, 1901	39.4



Water Power Development at Great Falls.

U. S. RECLAMATION SERVICE PROJECTS.

The following tabulations will give the names of the U. S. Reclamation Service Projects in the State of Montana, with the acreage in each project to be reclaimed; the percent completed to August, 1911; money expended on each Project up to August, 1911; and an estimate of the cost of completing the remaining work. Also a tabulation of Projects making regular delivery of water to settlers, giving amount of water prescribed per acre and also the amount actually delivered during 1911.

U. S. RECLAMATION SERVICE PROJECT DATA FOR MONTANA—1911.

Project.	Total Acreage to Be Reclaimed.....	Per Cent Complete, Aug. 1, 1911.....	Cost to Aug. 1, 1911.....	Estimated Cost of Completion.....
Blackfeet Project	133,000	47.0	$ 382,000	$ 376,000
Flathead Project	152,000	26.4	1,276,000	3,224,000
Fort Peck Project	152,000	8.7	192,000	2,008,000
Huntley Project	32,000	96.0	858,000	198,000
Milk River Project	215,000	12.0	921,000	5,970,000
Sun River Project	276,000	8.0	777,000	8,183,000
Lower Yellowstone Project	61,000	95.0	2,929,000	594,000
TOTALS	1,021,000	....	$7,335,000	$20,553,000

U. S. RECLAMATION SERVICE DUTY OF WATER. ON PROJECTS IN MONTANA FOR 1911.

Project.	Amount Prescribed In Public Notice.	Amount Delivered to Irrigators for Season of 1911.
Huntley	2½ Acre-feet.	1.8 Acre-feet.
Lower Yellowstone	2½ Acre-feet.	1.48 Acre-feet.
Sun River	2 Acre-feet.	1.65 Acre-feet.

LIST OF DEVELOPED POWER PLANTS IN MONTANA.

FURNISHED BY THE POWER COMPANIES.

Name.	Power Developed.
Big Hole	4,000 H. P.
Billings	2,500 H. P.
Madison, No. 1	3,000 H. P.
Madison, No. 2	14,400 H. P.
Livingston	2,700 H. P.
Black Eagle	8,360 H. P.
Lewistown	600 H. P.
Rainbow	36,000 H. P.
Canyon Ferry	12,000 H. P.
Hauser Lake	20,000 H. P.
Bonner	3,200 H. P.
Big Fork	1,500 H. P.
Dillon	500 H. P.
Virginia City	600 H. P.
Flint Creek	1,500 H. P.

The State of Montana is developing 1,000 H. P. on Race Track Creek to supply State Institutions and other plants are also being developed at this time by various private concerns, some of which will be larger than any yet built in this State, but data for publication is not available at this time.

TABLES OF RESERVOIR SITES.

The following list of reservoir sites enumerates the filings that have been made as shown by records of all the U. S. Land Offices in Montana. Each reservoir is listed when possible by the location of its dam site by section, township and range. So far as available, the area in acres, the capacity in acre-feet, the stream from which it receives its supply of water, the tributary basin and the main drainage basin in which it lies are also given. The next list gives similar information for a number of reservoir sites reported in the Annual Reports of the U. S. Geological Survey, and which do not appear from the Land Office records to have been claimed for storage purposes. The third list includes the reservoirs of the U. S. Reclamation Service, with information the same as for the preceding cases, except that the area in acres and the stream are omitted, for which are substituted the name of the project, and the name of the reservoir.

This combined data in tabulation gives us the prospective available flood water storage in our state as ascertained up to the present time, as well as that of the various drainage basins as tabulated in the summary following the main table.

STORAGE RESERVOIR SITES.

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
19	1 N	28 E	3.50	20	.....	Yellowstone	Yellowstone.
30	1 N	28 E	.....	85	Indian Creek	.... do	do
15	1 N	54 E	43.28	173	Coulee	Powder	do
7	2 N	30 E	.....	1	....do	Yellowstone	do
13	2 N	30 E	.....	6	Lost Bay Creek	.... do	do
17	2 N	33 E	4.50	12	Coulee	Bighorn	do
34	2 N	53 E	41.30	177	Ash Creek	Powder	do
..	3 N	11 E	67.20	2,735	Blue Lake	Yellowstone	do
..	3 N	11 E	27.40	820	Druckemiller Lake	.... do	do
..	3 N	11 E	38.50	1,100	N. Fk. Big Timber Creek	.... do	do
2	3 N	15 E	585.20	9,000	Otter Creek	.... do	do
14	3 N	15 E	768.00	22,390	Sweet Grass Creek	. .. do	do
34	4 N	51 E	3.22	18	Lonetree Creek	Powder	do
34	4 N	51 E	5.10	20	.....	.... do	do
24	5 N	12 E	700.00	28,300	Sweetgrass Creek	Yellowstone	do
8	6 N	13 E	27.93	2,620	Spring Creek	Musselshell	Missouri.
4	6 N	44 E	5.51	62	Gander Creek	Yellowstone	Yellowstone.
34	7 N	51 E	16.47	89	Short Creek	Powder	do
1	7 N	60 E	5.78	29	.....	Yellowstone	do
19	7 N	61 E	3.42	41	.....	Little Missouri	Little Missouri.
2	8 N	11 E	296.97	4,190	N. Fk. Musselshell	Musselshell	Missouri.
35	9 N	55 E	18.06	108	O'Fallon Creek	Yellowstone	Yellowstone.
{ 6	9 N	1 E	4,775.00	70,000	Missouri River	Missouri	Missouri.
{ 31	10 N	1 E			.....	.....	do
34	10 N	9 E	695.50	28,768	N. Fk. Musselshell	Musselshell	do
12	10 N	47 E	15.50	130	Coal Creek	Yellowstone	Yellowstone.
32	10 N	56 E	6.71	18	Y. V. Creek	.... do	do
26	11 N	56 E	14.80	106	Coulee	.... do	do
15	12 N	25 E	935.00	20,030	Flatwillow Creek	Musselshell	Missouri.
..	14 N	45 E	44.71	259	Ash Creek	Missouri	do
..	14 N	45 E	22.10	135	N. Ash Creek	.... do	do
3	15 N	43 E	103.46	310	Little Dry Creek	.... do	do
28	16 N	25 E	1,600.00	27,235	Forge Creek	Musselshell	do
31	16 N	26 E	240.00	4,000	....do	.... do	do
34	16 N	43 E	19.93	100	.....	Missouri	do
11	17 N	46 E	96.87	1,172	Duck Creek	.... do	do
14	17 N	46 E	157.28	2,736	....do	.... do	do
35	17 N	46 E	69.59	633	....do	.... do	do
7	17 N	48 E	32.70	268	Pasture Creek	.... do	do
8	17 N	48 E	28.72	204	....do	.... do	do
16	17 N	48 E	101.01	1,111	Tussler Creek	.... do	do
28	17 N	48 E	37.19	197	Sheep Creek	.... do	do
5	18 N	38 E	9.39	40	Veil Creek	.... do	do
29	18 N	47 E	116.21	1,469	Ash Creek	.... do	do
18	19 N	1 E	55.50	100	Dry Creek	.... do	do
..	20 N	39 E	8.55	51	S. Fk. Woody Creek	.. . do	do
8	20 N	39 E	5.19	47	....do	.... do	do
1	21 N	2 E	8.60	32	Coulee	Sun	do
4–5	21 N	8 E	152.03	610	....do	Missouri	do
23	22 N	4 E	5.53	26	Portage Coulee	. .. do	do

STORAGE RESERVOIR SITES—(Continued).
Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
9	22 N	7 E	135.92	*	.....	Missouri	Missouri.
5	22 N	9 E	3.54	18	Basin	.... do	do
14	22 N	12 E	193.60	1,258	....do	.... do	do
1	22 N	55 E	62.63	188	N. Fk. Fox Creek	Yellowstone	Yellowstone.
32	23 N	4 E	3.54	5	Coulee	Missouri	Missouri.
4-9-10	23 N	5 E	366.00	*	Lake	.... do	do
15-16	23 N	5 E	124.65	842	Huntley Coulee	.... do	do
16-21	23 N	5 E	87.32	382	....do	.... do	do
10	23 N	6 E	18.09	269	Basin	.... do	do
20	23 N	6 E	4.12	33	....do	.... do	do
1	23 N	10 E	1.16	6	Patterson Coulee	.... do	do
19	23 N	12 E	43.50	217	Lake	.... do	do
29	23 N	15 E	3.75	12	.....	.... do	do
..	23 N	17 E	5.40	32	Raglan Coluee	.... do	do
31-32	24 N	5 E	184.10	*	Lake	Marias	do
14	24 N	9 E	10.40	52	O'Hanlon Coulee	Missouri	do
33	24 N	9 E	14.57	87	Earley Coulee	.... do	do
10	24 N	10 E	3.31	19	Coulee	.... do	do
14	24 N	15 E	21.10	147	Chip Coulee	.... do	do
22	24 N	15 E	56.34	200	.... do	.... do	do
14	24 N	25 E	43.34	130	Coal Butte Coulee	.... do	do
6	24 N	29 E	18.40	65	Second Creek	.... do	do
12	24 N	29 E	14.92	77	N. Fk. Second Creek	.... do	do
15	24 N	29 E	150.47	827	Second Creek	.... do	do
8	24 N	30 E	13.25	47	.... do	.... do	do
..	24 N	31 E	105.00	1,050	Telegraph Creek	.... do	do
..	24 N	32 E	6.30	31	N. Fk. Telegraph Creek	.... do	do
11	24 N	49 E	237.20	2,856	Wolf Creek	.... do	do
7	24 N	50 E	296.53	3,588	.... do	.... do	do
..	24 N	50 E	100.00	700	.... do	.... do	do
12	24 N	56 E	44.05	440	N. Fk. Lonetree Creek	Yellowstone	Yellowstone.
15	24 N	58 E	56.63	226	Hay Creek	.... do	do
23	25 N	7 E	12.79	105	Coulee	Marias.	Missouri.
32	25 N	11 E	36.27	218	Rowe Coulee	Missouri	do
34	25 N	11 E	3.52	23	Glory Coulee	.... do	do
35	25 N	11 E	5.96	34	McClellan Coulee	.... do	do
3	25 N	14 E	1.41	7	Coulee	.... do	do
3	25 N	14 E	2.39	9	.... do	.... do	do
10	25 N	27 E	25.00	217	Parrot Coulee	Milk	do
18	25 N	28 E	121.30	727	7 Mile Coulee	.... do	do
12	25 N	32 E	286.60	1,146	Old Lake Bed	.... do	do
9	25 N	50 E	3.60	22	.....	Missouri	do
16	25 N	50 E	16.65	199	.....	.... do	do
12	25 N	56 E	4.91	19	Buckley's Creek	... do	do
25	25 N	56 E	45.78	183	.....	Yellowstone	Yellowstone.
22	25 N	57 E	19.70	57	Lake Coulee	.... do	do
26	25 N	57 E	35.33	205	N. Fk. Hay Creek	.... do	do
32	25 N	57 E	31.53	78	Hay Creek	.... do	do
16	25 N	59 E	367.33	3,085	Four Mile Creek	.... do	do
12	26 N	9 E	8.16	41	Basin	Marias	Missouri.

STORAGE RESERVOIR SITES—(Continued).
Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
21-28							
29-33	26 N	15 E	124.22	1,240	Dog Creek	Missouri	Missouri.
20	26 N	17 E	14.20	142	.....	.... do	do
..	26 N	29 E	69.00	403	Dry Beaver Creek	Milk	do
22	26 N	29 E	136.00	1,360	.... do	.... do	do
6	26 N	30 E	70.40	492	First Coulee	.... do	do
23	26 N	44 E	5.35	64	Little Miller Coulee	Missouri	do
24	26 N	44 E	14.72	140	Big Miller Coulee	.... do	do
10	26 N	49 E	6.50	39	Remley Coulee	.... do	do
10	26 N	49 E	9.40	56	.... do	.... do	do
6	26 N	55 E	61.00	183	E. Fk. Hardscrabble Creek	.... do	do
24	26 N	56 E	77.10	308	Cherry Creek	.... do	do
11	26 N	59 E	5.77	29	Slaughter House Coulee	.... do	do
2	27 N	7 E	2.06	10	Daulton Coulee	Marias	do
13	27 N	10 E	.....	*	.....	Missouri	do
13-24	27 N	10 E	294.00	1,764	Coulee	.... do	do
27	27 N	10 E	49.50	148	Basin	.... do	do
12-13	27 N	11 E	.....	*	.....	.... do	do
14	27 N	11 E	10.80	130	Coal Bank Coulee	.... do	do
28	27 N	11 E	22.66	199	W. Fk Coal Bank Coulee	.... do	do
4-5	27 N	12 E	.....	*	.....	.... do	do
11-14						.... do	do
23-24	27 N	12 E	489.39	3,800	Coulee	.... do	do
18	27 N	12 E	.....	*	.....	.... do	do
6-7	27 N	13 E	76.55	383	Little Sandy	.... do	do
29	27 N	13 E	13.14	69	Basin	.... do	do
30	27 N	13 E	85.00	642	Alkali Coulee	.... do	do
17	27 N	27 E	141.90	1,020	(Ditch) Big Warm Springs	Milk	do
2	27 N	28 E	157.30	1,258	Four Mile Coulee	.... do	do
29	27 N	30 E	117.00	702	J. Brown Coulee	.... do	do
33	27 N	30 E	190.00	1,140	.... do	.... do	do
2	27 N	40 E	77.50	360	Daggir Creek	.... do	do
20	27 N	40 E	385.73	1,008	Long Lake	.... do	do
33	27 N	49 E	21.20	169	Nick Wall Creek	Missouri	do
31	27 N	50 E	13.40	53	Lake Creek	.... do	do
23	27 N	53 E	179.60	837	E. Charlie Creek	.... do	do
10	27 N	58 E	21.32	74	Brush Coulee	.... do	do
12	27 N	58 E	69.77	279	Little Muddy	.... do	do
14	27 N	58 E	91.85	459	.... do	.... do	do
16	27 N	58 E	21.85	131	Springdale Coulee	.... do	do
17	27 N	58 E	26.65	186	.... do	.... do	do
17	27 N	58 E	10.48	31	.... do	.... do	do
3	27 N	59 E	46.06	368	Horsetied Creek	.... do	do
5	27 N	59 E	42.11	252	.... do	.... do	do
32-35	28 N	1 E	276.72	1,383	Pondera Coulee	Marias	do
33-34	28 N	12 E	.....	*	.....	Missouri	do
2	28 N	13 E	6.52	31	German Creek	Milk	do
27	28 N	13 E	17.14	*	Basin	.... do	do
19	28 N	14 E	17.14	171	.... do	.... do	do
5	28 N	22 E	9.70	70	.....	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
18	28 N	22 E	61.84	371	Lake	Milk	Missouri.
19	28 N	22 E	171.14	907	Putnam Lake	.... do	do
25	28 N	26 E	75.10	901	S. Fk. Wild Horse Creek	.... do	do
35-36	28 N	27 E	205.16	575	Spring Coulee (Ditch W. H. Cr)	.... do	do
2	28 N	28 E	203.40	1,220	W. Fk. Alkali Creek	.... do	do
11	28 N	29 E	40.00	250	.... do	.... do	do
19	28 N	30 E	330.00	1,320	Alkali Creek	.... do	do
15	28 N	31 E	96.20	769	Dry Lake Bed	.... do	do
21	28 N	31 E	171.10	1,368	Old Lake	.... do	do
24	28 N	31 E	79.30	198	.... do	.... do	do
32	28 N	31 E	20.30	40	.... do	.... do	do
34	28 N	31 E	119.40	597		.... do	do
35	28 N	31 E	257.60	1,413	Dry Lake Bed	.... do	do
13	28 N	32 E	118.00	1,180	Beaver Creek	.... do	do
21	28 N	32 E	61.40	307	Dry Lake Bed	.... do	do
13	28 N	38 E	342.10	3,252	Brazil Creek	.... do	do
26	28 N	39 E	430.00	3,010	Willow Creek	.... do	do
31	28 N	40 E	195.00	1,950	.... do	.... do	do
36	28 N	46 E	10.50	31	Butch Coulee	Missouri	do
25	28 N	56 E	11.38	34	Stafford Coulee	.... do	do
30	28 N	56 E	18.14	227	McBrides Creek	.... do	do
20	28 N	58 E	42.10	210	W. Fk. Red Bank Creek	.... do	do
27	28 N	58 E	33.08	101	Rays Coulee	.... do	do
20-21							do
28-29	29 N	1 E	55.28	1,094	Wilson Coulee	Marias	do
35	29 N	2 E	98.68	400	Dead Indian Coulee	.... do	do
17	29 N	11 E	41.60	208	Basin	Milk	do
4-5	29 N	13 E	148.89	235	Big Sandy	.... do	do
4-5	29 N	13 E	163.22	260	.... do	.... do	do
7	29 N	14 E	5.90	60	Wind Creek	.... do	do
20	29 N	14 E	.....	*	Big Sandy	.... do	do
24	29 N	14 E	.....	*	.... do	.... do	do
30	29 N	15 E	.....	*	.... do	.... do	do
2	29 N	17 E	13.20	52		.... do	do
22	29 N	17 E	1.20	7	Grindstone Creek	.... do	do
3	29 N	18 E	5.95	48	E. Fk. Bean Creek	.... do	do
4	29 N	18 E	6.80	45	Coulee	.... do	do
6	29 N	18 E	3.50	25	Wind Creek	.... do	do
12	29 N	18 E	8.97	45	Little Snake	.... do	do
7	29 N	21 E	56.00	308		.... do	do
14	29 N	21 E	21.50	75		.... do	do
27	29 N	21 E	72.70	438	Lake	.... do	do
34	29 N	29 E	34.40	258	Partridge Coulee	.... do	do
7	29 N	30 E	17.00	136	Carroll Coulee	.... do	do
21	29 N	32 E	1,163.00	4,200	Beaver Creek	.... do	do
32	29 N	38 E	184.00	920	Antelope Coulee	.... do	do
4-5	30 N	5 E	186.38	932	Dry Lake	Marias	do
13-14	30 N	13 E	270.50	1,620	Big Sandy	Milk	do
22	30 N	14 E	1.97	5	Coulee	.... do	do
35	30 N	14 E	41.51	208	Basin	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
23	30 N	17 E	41.89	560	Clear Creek	Milk	Missouri.
10	30 N	18 E	8.36	75	Dry Coulee	.... do	do
22	30 N	19 E	.79	*	Snake Creek	.... do	do
7	30 N	20 E	76.36	137	.....	.... do	do
26	30 N	29 E	13.00	162	Cottonwood Coulee	.... do	do
34	30 N	29 E	12.30	123	Box Elder Coulee	.... do	do
28	30 N	30 E	16.80	141	Morton Coulee	.... do	do
28	30 N	30 E	424.00	1,272	.... do	.... do	do
30	30 N	32 E	78.10	350	Spring Coulee	.... do	do
7	30 N	36 E	9.63	35	Ash Coulee	.... do	do
21	30 N	37 E	75.00	750	Buffalo Coulee	.... do	do
6	30 N	39 E	45.50	270	Spring Coulee	.... do	do
6	30 N	39 E	17.20	93	Spring Creek	.... do	do
18	30 N	57 E	215.36	1,077	Duck Creek	Missouri	do
5	31 N	18 E	60.80	456	Lake	Milk	do
17	31 N	18 E	37.30	261	Clear Creek	.... do	do
13	31 N	20 E	16.14	48	Dry Coulee	.... do	do
25	31 N	20 E	102.08	510	.....	.... do	do
14	31 N	21 E	18.70	112	Coulee	.... do	do
2	31 N	27 E	61.40	179	Castleburg Coulee	.... do	do
2	31 N	29 E	33.50	201	Assinniboine Creek	.... do	do
23	31 N	29 E	12.18	46	S. Fk. Spring Coulee	.... do	do
6	31 N	32 E	46.40	*	Lone Tree Lake	.... do	do
..	31 N	32 E	8,609.00	26,250	Lake Bowdoin-Beaver Creek	.... do	do
30	31 N	34 E	26.40	132	First Creek	.... do	do
2	31 N	35 E	119.80	239	Drabbs Coulee	.... do	do
5	31 N	36 E	123.20	362	High Hill Coulee	.... do	do
7	31 N	36 E	147.51	350	Old Lake	.... do	do
11	31 N	36 E	14.00	84	Whitehead ..Coulee	.... do	do
33	31 N	37 E	60.80	243	Rabbit Coulee	.... do	do
13–14	32 N	11 E	108.62	434	Sage Creek	.... do	do
15	32 N	11 E	57.45	344	..... do	.... do	do
1	32 N	16 E	5.87	29	Carnal Coulee	.... do	do
4	32 N	19 E	46.30	184	Lake	.... do	do
7	32 N	19 E	24.30	121	3 Mile Coulee	.... do	do
7	32 N	19 E	91.60	450	3 Mile Creek	.... do	do
11	32 N	19 E	81.57	480	3 Mile Coulee	.... do	do
11	32 N	20 E	18.45	92	.....	.... do	do
15	32 N	20 E	80.05	480	Lake	.... do	do
18	32 N	20 E	28.69	*	Coulee	.... do	do
8	32 N	21 E	74.81	222	Water from Paradise Canal	.... do	do
7	32 N	23 E	58.18	203	Parallel Creek	.... do	do
..	32 N	26 E	.....	*	.....	.... do	do
2	32 N	27 E	247.00	1,000	E. Fk. Mud Creek	.... do	do
12	32 N	28 E	5.14	54	Garland Creek	.... do	do
16	32 N	29 E	21.43	85	Long Lake	.... do	do
24	32 N	29 E	171.60	343	Log Cabin Coulee	.... do	do
26	32 N	29 E	22.10	88	Sag Coulee	.... do	do
32	32 N	29 E	37.80	219	Assiniboine Creek	.... do	do
29	32 N	30 E	27.70	55	Basin Coulee	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
9	32 N	32 E	662.40	3,643	.....	Milk	Missouri.
33	32 N	32 E	510.10	*	Long Lake	.... do	do
15	32 N	34 E	56.25	196	Dry Lake	.... do	do
2	32 N	35 E	16.50	82	Middle Fk. Cash Creek	.... do	do
27	32 N	36 E	36.68	55	Pappoose Creek	.... do	do
..	32 N	36 E	14.87	23	.... do	.... do	do
..	32 N	36 E	34.34	62	.... do	.... do	do
34	32 N	36 E	50.43	100	.... do	.... do	do
17	32 N	37 E	92.00	392	Lime Creek	.... do	do
32	32 N	38 E	5.30	15	Brush Fk. Bear Creek	.... do	do
36	33 N	10 E	272.00	2,175	Sage Creek	.... do	do
1	33 N	17 E	108.41	758	Red Rock Coulee	.... do	do
24	33 N	17 E	64.97	195	Coulee	.... do	do
36	33 N	17 E	27.76	105	.... do	.... do	do
5	33 N	18 E	7.88	50	.....	.... do	do
7	33 N	18 E	76.80	576	Red Rock Supply	.... do	do
10	33 N	18 E	12.1	121	.....	.... do	do
11	33 N	18 E	16.60	92	Coulee	.... do	do
17	33 N	18 E	75.84	240	Red Rock Coulee	.... do	do
32	33 N	22 E	72.40	500	.....	.... do	do
35	33 N	22 E	61.50	185	Parallel Creek	.... do	do
4	33 N	28 E	155.75	900	Woody Island Creek	.... do	do
11	33 N	29 E	39.80	119	Round Lake	.... do	do
12	33 N	29 E	48.78	292	Little Cottonwood	.... do	do
18	33 N	29 E	18.64	55	.... do	.... do	do
9	33 N	31 E	24.30	291	Martin Coulee	.... do	do
26	33 N	32 E	118.40	592	Whitewater Creek	.... do	do
33	33 N	35 E	15.60	78	Big Coulee	.... do	do
14–23	34 N	10 E	482.00	1,440	Coulee	.... do	do
4–5	34 N	15 E	173.33	1,213	Red Rock Coulee	.... do	do
9	34 N	16 E	48.53	340	.... do	.... do	do
20	34 N	18 E	67.16	335	.....	.... do	do
3	34 N	19 E	203.40	1,017	Lake and Coulee	.... do	do
9	34 N	19 E	85.40	384	Dry Fork Coulee	.... do	do
34	34 N	19 E	19.70	98	Lakebed	.... do	do
24	34 N	20 E	187.00	560	Grass Lake Reservoir	.... do	do
30	34 N	25 E	34.92	130	Duck Lake	.... do	do
2	34 N	29 E	84.00	588	Little Cottonwood	.... do	do
12	34 N	29 E	43.74	131	E. Fk. Little Cottonwood	.... do	do
34	34 N	29 E	43.00	301	Little Cottonwood	.... do	do
12	34 N	30 E	10.80	43	Dry Coulee	.... do	do
11	34 N	31 E	984.00	7,872	Whitewater Creek	.... do	do
28	34 N	31 E	22.00	77	Coulee	.... do	do
32	34 N	32 E	1,375.00	16,500	Whitewater Creek	.... do	do
2	34 N	34 E	34.30	514	Cora Coulee	.... do	do
10	34 N	34 E	12.10	121	Rattlesnake Coulee	.... do	do
15	34 N	36 E	41.40	207	S. Fk. Little Snake Creek ...	.... do	do
..	34 N	54 E	42.80	171	Willow Creek	Missouri	do
..	34 N	54 E	54.20	108	Jim Creek	.... do	do
..	34 N	55 E	21.30	64	Diamond Coulee	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
..	34 N	55 E	254.00	508	Rush Coulee	Missouri	Missouri.
13	35 N	9 E	293.60	1,761	Coulee	Milk	do
32	35 N	18 E	372.74	1,864	Meadow Coulee	.... do	do
25	35 N	20 E	390.40	1,561	Lake	.... do	do
2	35 N	29 E	24.00	120	Hay Lake Coulee	.... do	do
6	35 N	29 E	203.20	1,500	Horseshoe Coulee	.... do	do
13	35 N	29 E	494.90	1,979	Wren Coulee	.... do	do
35	35 N	29 E	84.30	337	Mount Creek	.... do	do
17	35 N	30 E	44.30	132	Wren Coulee	.... do	do
24	35 N	30 E	125.00	750	Lone Tree Coulee	.... do	do
14	35 N	31 E	108.00	864	Whitewater Creek	.... do	do
18–19	36 N	2 E	23.27	163	Lake	Marias	do
19–20	36 N	2 E	15.07	60	.... do	.... do	do
22–27	36 N	2 E	20.10	100	Canon Coulee	.... do	do
2	36 N	17 E	.....	*	.....	Milk	do
19	36 N	19 E	58.40	350	Burrel Coulee	.... do	do
1	36 N	27 E	35.40	300	.....	.... do	do
7	36 N	27 E	245.83	449	Woody Island Creek	.... do	do
13	36 N	27 E	20.80	110	Cowan Coulee	.... do	do
21–22	36 N	27 E	156.74	323	Woody Island Creek	.... do	do
5	36 N	29 E	70.00	213	Spider Lake	.... do	do
26	36 N	29 E	68.40	171	Blue Lake Coulee	.... do	do
19	36 N	32 E	135.00	540	E. Fk. Whitewater	.... do	do
32	37 N	1 E	47.27	235	Lake	Marias	do
1	37 N	7 E	128.54	400	.... do	Milk	do
32	37 N	22 E	188.40	942	Coulees and Lake beds	.... do	do
36	37 N	25 E	219.85	2,750	Woody Island Creek	.... do	do
11	37 N	29 E	71.80	718	N. Fk. Whitewater	.... do	do
36	37 N	31 E	1,119.49	6,756	Lake—E. Fk. Whitewater	.... do	do
..	37 N	48 E	446.20	2,230	M. Fk. Poplar	Missouri	do
23	37 N	51 E	9.29	37	Beaver Creek	.... do	do
27	37 N	51 E	16.08	64	Whitetail Creek	.... do	do
15	37 N	52 E	407.02	1,349	Big Muddy	.... do	do
30	1 S	54 E	79.00	398	Crow Creek	Powder	Yellowstone.
25	2 S	6 E	8.71	*	Bear Creek	Gallatin	Missouri.
2	2 S	26 E	5.00	25	Blue Creek	Yellowstone	Yellowstone.
25	2 S	53 E	7.27	49	Horse Creek	Powder	do
11	3 S	1 E	460.00	21,000	Madison River	Madison	Missouri.
21	3 S	7 E	4.02	20	Bear or Flannery	Gallatin	do
26	3 S	7 E	15.43	154	Trail Creek	Yellowstone	Yellowstone.
28	3 S	7 N	3.60	22	Bear or Flannery Creek	Gallatin	Missouri.
30	3 S	7 E	57.70	1,200	Bozeman Creek	.... do	do
15	3 S	54 E	6.64	34	Jensen Creek	Powder	Yellowstone.
..	4 S	49 E	44.90	278	Twotree Butte Creek	.... do	do
..	4 S	49 E	55.50	322	.... do	.... do	do
..	4 S	49 E	63.30	241	.... do	.... do	do
7	4 S	50 E	17.04	58	Mizpah Creek	.... do	do
..	4 S	50 E	204.79	871	Wolf Creek	.... do	do
..	4 S	50 E	91.76	303	Twotree Butte Creek	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
..	4 S	50 E	176.30	617	Twotree Butte Creek	Powder	Yellowstone
2	4 S	59 E	11.80	110	Foster Creek	Little Missouri	Little Missouri.
4	4 S	59 E	10.35	62	McCarty Draw	.... do	do
33	4 S	59 E	47.20	359	Prairie Dog Creek	.... do	do
24	4 S	60 E	44.06	617	Hackberry Creek	.... do	do
24	4 S	61 E	11.02	75	Bull Creek	.... do	do
35	4 S	61 E	32.13	166	Coulee	.... do	do
35	4 S	61 E	14.25	101	.... do	.... do	do
5	4 S	62 E	98.75	550	Tie Creek	.... do	do
28	4 S	62 E	16.25	136	Sand Creek	.... do	do
30	4 S	62 E	.....	*	Coulee	.... do	do
30	4 S	62 E	21.00	141	Claim Creek	.... do	do
33	5 S	56 E	25.25	68	Spring Creek	.... do	do
1	5 S	57 E	98.25	491	Muskrat Creek	.... do	do
15	5 S	58 E	86.11	840	Trail Creek	.... do	do
21	5 S	58 E	21.60	140	.... do	.... do	do
28	5 S	58 E	17.47	45	Brick Top Draw	.... do	do
35	5 S	58 E	13.17	86	Trail Creek	.... do	do
26	5 S	61 E	17.55	79	Coulee	.... do	do
27	5 S	61 E	200.45	2,004	Carroll Creek	.... do	do
32	5 S	61 E	33.80	160	Finger Butte Creek	.... do	do
18	5 S	62 E	17.91	*	Coulee	.... do	do
19	5 S	62 E	13.15	66	Gumbo Creek	.... do	do
27	5 S	62 E	24.23	*	Coulee	.... do	do
27	5 S	62 E	23.87	153	Prairie Dog Creek	.... do	do
33	6 S	22 E	272.24	6,700	Sand Creek	Clarke Fork	Yellowstone.
6	6 S	58 E	1.91	8	Coulee	Little Missouri	Little Missouri.
7	6 S	58 E	3.51	19	.... do	.... do	do
1	6 S	62 E	34.90	301	Siam Creek	.... do	do
6	6 S	62 E	30.50	93	Coulee	.... do	do
1	7 S	62 E	46.14	155	.... do	.... do	do
20	8 S	60 E	17.86	143	Box Elder Creek	.... do	do
17	9 S	39 E	14.70	103	Squirrel Creek	Tongue	Yellowstone.
2	9 S	59 E	7.12	35	Coulee	Little Missouri	Little Missouri.
16	12 S	4 E	13,415.50	275,000	Madison River	Madison	Missouri.
25	4 N	6 W	1,448.86	10,100	S. Fk. Whitetail Creek	Jefferson	Missouri.
31	4 N	21 W	872.26	25,000	Rock Creek	Bitterroot	Clark Fork of Columbia
7	5 N	13 W	2,666.00	25,000	E. Fk. Flint and Stewart Cr.	Clark Fork of Columbia	do
27	6 N	22 W	11.90	161	Canyon Creek	Bitterroot	do
31	6 N	22 W	22.30	201	.... do	.... do	do
33	6 N	22 W	30.10	163	.... do	.... do	do
..	7 N	22 W	16.65	200	Middle Fk. Bear Creek	.... do	do
..	7 N	22 W	3.84	46	South Fk. Bear Creek	.... do	do
..	7 N	22 W	19.98	240	.... do	.... do	do
..	8 N	22 W	4.27	48	N. Fk. Sweathouse Creek	.... do	do
..	8 N	22 W	1.28	10	.... do	.... do	do
..	8 N	22 W	6.84	80	.... do	.... do	do
35	10 N	12 W	79.70	1,200	Dunkleberg Creek	Clark Fork of Columbia.	do
33	13 N	6 W	284.18	284	Marsh Creek	Missouri	Missouri.
30	19 N	1 W	781.30	1,600	Old Lake	.... do	do

STORAGE RESERVOIR SITES—(Continued).

Filed in U. S. Land Offices in Montana.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
34	19 N	1 W	753.20	1,500	Muddy Creek	Missouri.	Missouri
8	19 N	2 W	84.30	874	Lake	.... do	do
8	21 N	29 W	530.00	*	Clark Fork of Columbia	Clark Fork of Columbia	Clark Fork of Columbia.
33	22 N	28 W	25.70	*	Thompson River	Thompson	do
26	22 N	30 W	1,728.00	43,200	Clark Fork of Columbia	Clark Fork of Columbia	do
31-33	23 N	4 W	.....	*	.....	Marias	Missouri.
5-8	24 N	4 W	102.36	*	Teton River	.... do	do
3	24 N	8 W	25.00	625	N. Fk. Willow Creek	.... do	do
31	25 N	5 W	150.78	*	Teton River	.... do	do
34	25 N	5 W	47.45	*	.... do	.... do	do
8-17	25 N	6 W	220.87	2,006	.... do	.... do	do
4	26 N	2 W	5.70	19	S. Fk. Pondera Coulee	.... do	do
31-32	26 N	6 W	3,387.19	69,500	Teton River	.... do	do
21-28	27 N	2 W	36.00	151	S. Fk. Pondera Coulee	.... do	do
27	28 N	10 W	506.00	30,000	Birch Creek	.... do	do
..	28 N	23-24 W	2,930.00	8,750	Ashley Creek	Flathead	Clark Fork of Columbia
17	29 N	2 W	17.29	164	Coulee	Marias	Missouri.
29-32	29 N	4 W	1,421.00	47,875	Dry Fk. of Marias	.... do	do
4-11,14-18	29 N	5 W	5,720.00	112,000	Dupuyer Cr. and Birch Cr.	.... do	do
5-8	30 N	3 W	76.64	209	Lake	.... do	do
19	32 N	2 W	3.45	26	Basin	.... do	do
17	36 N	1 W	6.13	20	Coulee	.... do	do
..	3 S	3 W	26.72	465	S. Willow Creek	Jefferson	Missouri.
..	5 S	11 W	130.73	2,290	Tent and Altusa Creeks	.... do	do
..	6 S	11 W	62.34	1,153	Carnes or Basin Creek	.... do	do
33	7 S	7 W	10.05	100	Carter Creek	.... do	do
..	11 S	5 W	21.35	213	Alkali Creek	.... do	do
25	11 S	6 W	1.98	30	Wooding Creek	.... do	do
35	11 S	6 W	8.32	166	Middle Fork Creek	.... do	do
1	12 S	6 W	7.71	135	.... do	.... do	do
32	13 S	6 W	22,125.71	100,000	Red Rock Lake	.... do	do
..	14 S	8 W	12.92	214	Birch Creek	.... do	do
(a)	.. N	.. E	10.50	40	Dry Beaver Creek	Milk	do
(b)	.. N	29 E	25.73	77	1st Creek	.... do	do
(c)	.. N	.. E	44.00	352	.... do	.... do	do
(d)	.. N	.. E	2.78	33	Coulee	.....	.....
(e)	.. S	.. E	17.00	*	Big Young Creek	.....	.....

*See note to final table of storage capacities.
a—1 mile west of Valley-Chouteau County line.
b—Valley-Chouteau County line.
c—Valley County at Chouteau County line.
d—N. E. part of Dawson County.
e—4325 ft. N. E. 204 mile post, Mont.-Wyo. line.

UNCLAIMED RESERVOIR SITES LOCATED BY. U. S. G. S.

Sec.	Twp.	Range	Area in Acres	Capacity Acre-feet	Stream.	Tributary Basin.	Drainage Basin.
8	6 N	8 E	1,055	19,781	Sixteen Mile Creek	Missouri	Missouri.
6	6 N	14 E	a676.2	*	Lebo Creek	Musselshell	do
8-9	7 N	7 E	110	1,230	S. Fk. Smith River	Smith	do
32	7 N	8 E	120	1,125	.... do	.... do	do
35	8 N	9 E	25	*	S. Fk. Musselshell	Musselshell	do
35-36	8 N	9 E	100	*	.... do	.... do	do
1	9 N	1 E	15	*	Basin	Missouri	do
29	9 N	11 E	40	800	N. Fk. Musselshell	Musselshell	do
33	9 N	11 E	30	160	....	.... do	do
33	9 N	12 E	20	105	Daisy Dean Creek	.... do	do
34	9 N	12 E	30	390	.... do	.... do	do
36	13 N	11 E	100	3,000	Middle Fk. Judith	Judith	do
11	14 N	12 E	30	250	Sage Creek	.... do	do
5	14 N	13 E	35	200	Dry Basin	.... do	do
9	14 N	13 E	55	350	Dry Lake Basin	.... do	do
14	16 N	8 E	70	1,500	W. Fk. Otter Creek	Missouri	do
22	20 N	5 E	180	3,000	Box Elder Creek	.... do	do
2	9 N	2 W	50	*	Basin	.... do	do
12	20 N	8 W	378	6,081	Willow Creek	Sun	do
17	21 N	7 W	150	2,091	.... do	.... do	do
21	21 N	7 W	293	5,226	.... do	.... do	do
..	21 N	10 W	581	19,591	S. Fk. of N. Fk. Sun	.... do	do
20	22 N	7 W	275	4,894	Sun River	.... do	do
32	22 N	7 W	72	727	.... do	.... do	do
..	22 N	8 W	367	13,013	.... do	.... do	do
4	5 S	8 W	11,800	*	Big Hole River	Jefferson	do
8	7 S	4 W	400	*	Ruby	.... do	do
24	9 S	8 W	600	*	Blacktail Deer Creek	.... do	do
2	9 S	10 W	1,400	*	Beaverhead River	.... do	do
36	13 S	8 W	1,200	*	Red Rock River	.... do	do

a—Area segregated.
*—See note to final table of storage capacities.

U. S. RECLAMATION SERVICE RESERVOIR SITES.

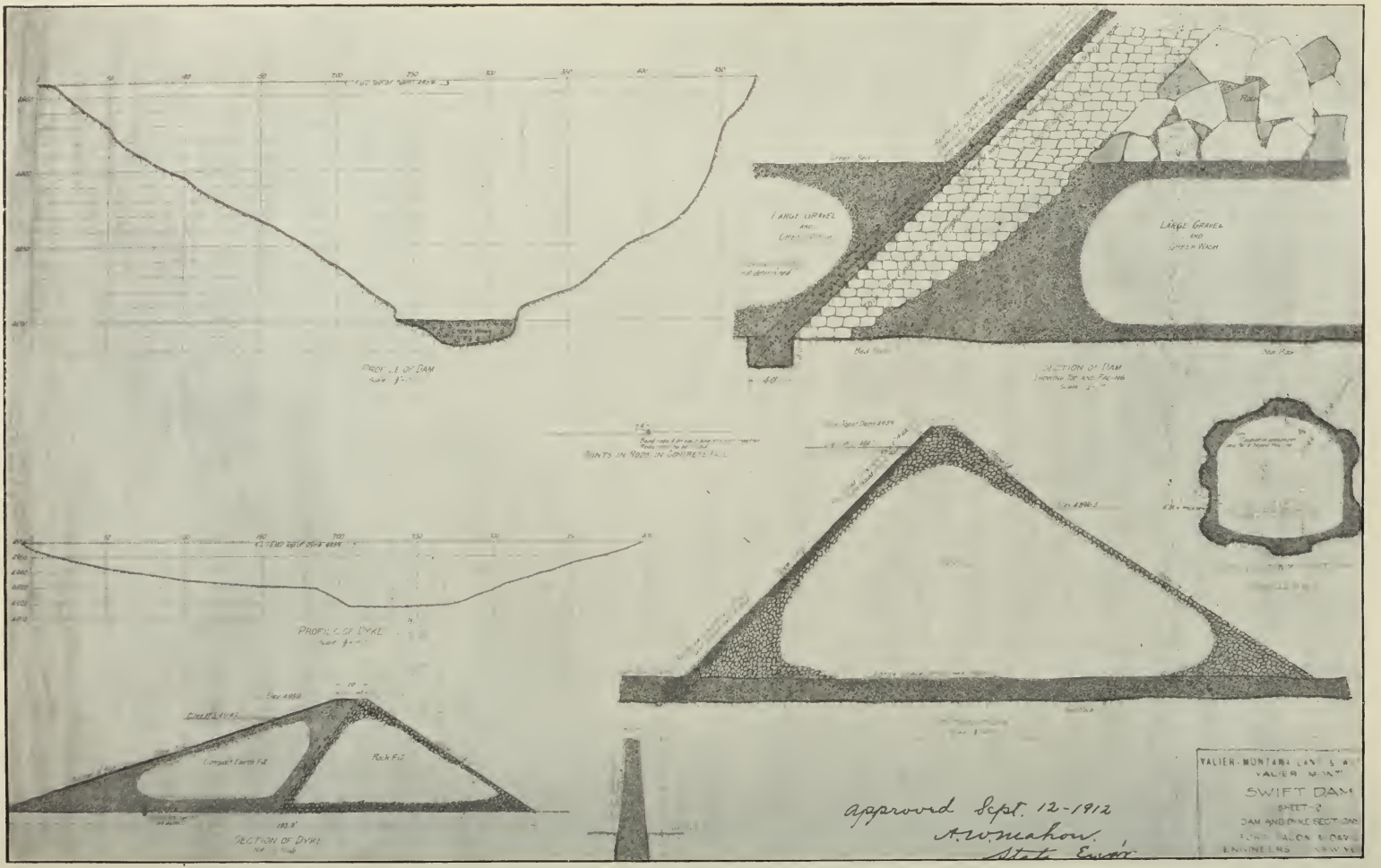
Sec.	Twp.	Range	Capacity Acre-feet	Project.	Name of Reservoir.	Tributary Basin.	Drainage Basin.
35	32 N	13 W	16,000	Blackfeet	Two Medicine Lake	Marias	Missouri.
19	30 N	8 W	60,640	....do	Four Horns	.... do	do
2	32 N	8 W	29,000	....do	Spring Lake	.... do	do
10	29 N	11 W	100,000	....do	Badger Creek	. do	do
..	22 N	20 W	1,800,000	Flathead	Flathead Lake	Flathead	Clark Fork of Columbia.
..	27 N	24 W	6,000	....do	Little Bitterroot Lake	.... do	do
..	20 N	19 W	6,800	....do	Kickinghorse	.. . do	do
10	19 N	19 W	10,600	....do	McDonald Lake	.... do	do
34	20 N	20 W	15,100	....do	Ninepipe	.... do	do
17, 20, 21	22 N	20 W	29,600	....do	Pablo	.... do	do
6	17 N	18 W	24,000	....do	St. Mary Lake	.... do	do
..	24 N	23 W	9,330	....do	Big Draw	.... do	do
36	21 N	25 W	3,200	do	Dog Lake	.... do	do
34	23 N	24 W	1,918	....do	Dry Fork	.... do	do
..	25 N	24 W	20,000	....do	Hubbart	.... do	do
..	20 N	21 W	9,485	....do	Lower Crow Creek	.... do	do
..	18 N	19 W	2,000	....do	McConnel	.... do	do
..	18 N	19 W	3,300	....do	Mission	.... do	do
..	22 N	21 W	1,700	....do	Polson	.... do	do
18	22 N	19 W	937	....do	Twin	.... do	do
7	30 N	54 E	2,000	Fort Peck	Smoke Creek	Missouri.	Missouri.
31	33 N	54 E	4,000	....do	Wolf Creek	.... do	do
27	32 N	49 E	10,000	....do	Poplar River	.... do	do
..	27 N	44 E	3,900	....do	Frazer	.... do	do
..	32 N	32 E	190,430	Milk River	Nelson	Milk	do
..	34 N	13 E	437,560	....do	Chain of Lakes	.... do	do
..	35 N	14 W	218,000	Milk R.-St. Mary	St. Mary Lakes	St. Mary	St. Mary.
..	36 N	15 W	30,000	....do	Sherbourne Lakes	.... do	do
..	.. N	.. W	10,000	....do	McDermott Lake	.... do	do
30	21 N	6 W	86,000	Sun River	Willow Creek	Sun	Missouri.
..	22 N	10 W	156,800	....do	Warm Springs	.... do	do
1	22 N	7 W	45,700	....do	Pishkun	.... do	do
25	22 N	3 E	140,200	....do	Benton Lake	.... do	do
2	22 N	1 W	33,128	....do	Muddy Creek	.... do	do

STORAGE CAPACITY OF RESERVOIR SITES.

Listed in Each Drainage Basin.

Drainage Basin.	Tributary Basin	Storage Capacity in Acre-Ft.	
		Tributary Basin	Drainage Basin
Clark Fork of Columbia	Bitterroot	26,149	
	Clark Fork	69,400	
	Flathead	1,952,720	2,048,269
Little Missouri	Little Missouri	7,244	7,244
Missouri	Gallatin	1,242	
	Jefferson	114,866	
	Judith	3,800	
	Madison	296,000	
	Marias	472,728	
	Milk	771,331	
	Missouri	159,774	
	Musselshell	88,298	
	Smith	2,355	
	Sun	513,483	2,423,877
St. Mary	St. Mary	258,000	258,000
Yellowstone	Bighorn	12	
	Clark Fork	6,700	
	Powder	3,648	
	Tongue	103	
	Yellowstone	69,551	80,014
	Total for Montana		*4,817,404

*Note:—The storage capacity of a number of reservoirs is not known, and so is not included in the summary.



"Swift Dam", Rock-Fill Type, on the Valier "Carey" Project.

REPORT
OF THE
CAREY LAND ACT BOARD
OF THE
STATE OF MONTANA
FOR THE YEARS
1911-1912

A. W. MAHON, State Engineer, Secretary.

Under an Act of Congress approved August 18th, 1894, known as the "Carey Act," the State of Montana and other public land states were each donated one million acres of land from the public domain conditioned upon the same being desert in character and that it be reclaimed by irrigation under State supervision.

The State of Montana accepted the terms of this Act, and passed the necessary legislation, which has been amended at different times and from which has emanated the present Carey Land Act Board of the State of Montana, consisting of Governor Edwin L. Norris, Chairman; Secretary of State, T. M. Swindlehurst; and Attorney General, A. J. Galen; with the State Engineer, A. W. Mahon, as its official Secretary. The law also provides for an assistant secretary and prescribes his duties, and this position has been occupied by Mr. George R. Davies, who has proven a prudent and pains-taking official, and his administration of the affairs under his charge has been most satisfactory.

The Federal and State laws and the regulations under which the "Carey Act" operates in this State are printed in a pamphlet which may be had upon application to this office, so it is unnecessary to reprint them here.

Results obtained in this State in the past under the operation of this law, have in some instances been unfortunate. When the provisions of this Act were first taken advantage of by the State, under the old Arid Land Grant Commission, a large indebtedness was incurred against the "Carey" fund, which must be discharged by the sale of "Carey" land. Through other unfortunate circumstances, the State has been disappointed in the sale of these lands, and even for the lands sold the price to be received by the State has been placed too low to properly discharge the debt against this fund and also maintain the expense of administering the Department. During the present year, however, the Carey Land Act Board has made an order placing the price to be paid to the State for all "Carey" land not

already under contract at $1.50 per acre. Under this order, we may expect to discharge all indebtedness against this fund.

There appears to be no valid reason why this Act should not prove as great a success in this State as it has in others, and I believe the results will prove most gratifying in the future. The principal reason for the difficulties of the past seem to have been lack of experience and precedents in the operation and administration of such a law. The rules which were adopted were strict enough, but the actual operation seems to have been lax, and segregations of land have been made in this office, with statements of reclamation possibilities and water supply that have been accepted without adequate investigation having been made to ascertain whether the facts justified their approval, or at least such were my conclusions, after taking up each project in turn to ascertain its merits, when I took the office in March, 1911.

During the past year the Carey Land Act Board has taken summary action in cancelling some of these segregations and relinquishing the land back to the United States Government. It has also materially reduced the acreage of other projects to conform to the probable water supply available for reclamation. And it has served notice on others that dilatory tactics would not be countenanced, but the projects must be taken up in a business-like manner and pushed to consummation with all due diligence or the segregation would be cancelled.

The present attitude of the Carey Land Act Board upon these questions has placed the operation of this law upon a sound basis for future accomplishments.

The present status of the several "Carey" Projects are herewith submitted under their respective titles. To secure uniform information from the different companies, I prepared the following questions for each to answer and submit to this office, to-wit:

Name of project:
Name of company:
Postoffice address:
County in which lands are situated:
Description of location:
    Altitude:
    Topography:
    Soil:
Description of water supply:
    Stream or streams from which water supply is obtained:
    Whether running or flood water or both:
    Number of reservoirs with area and capacity of each:
Water otherwise appropriated on the stream or streams:
Canal leading from stream to land or reservoir:
    Length:
    Size:
    Capacity:
Length of main canal from reservoir completed:
Length of main canal from reservoir to be built:
Length of main laterals completed:
Length of main laterals to be built:
Length of distributing laterals completed:
Length of distributing laterals to be built:

Total length of canals and laterals completed:
Total length of canals and laterals to be built:
General description of project:
Character of construction:
Number and character of structures:
Engineering difficulties:
Total estimated cost of project:
Total expenditures to October 31, 1912.
Price of water right per acre for Carey Act lands:
Price of water right per acre for lands owned by company:
Price of water right per acre for lands other than company or Carey lands:
Terms of payment on water contracts:
Total number of acres within the boundaries of project:
Total number of acres susceptible of irrigation for
Carey:
Private:
Railroad:
State:
Total number of acres to be actually irrigated by project:
What necessities for drainage system have arisen:
What drainage is contemplated:
What character of drainage has been adopted and to what extent in actual construction:
Number of acres of Carey land filed on:
Number of acres of Carey land filed on susceptible of irrigation:
Number of acres of Carey land open to entry:
Number of acres of Carey land open to entry susceptible of irrigation:
Amount of water per acre required to be furnished by Carey Board:
Amount of water per acre actually required by the land:
Method of measuring water to the farm units:
Method of record of water delivery:

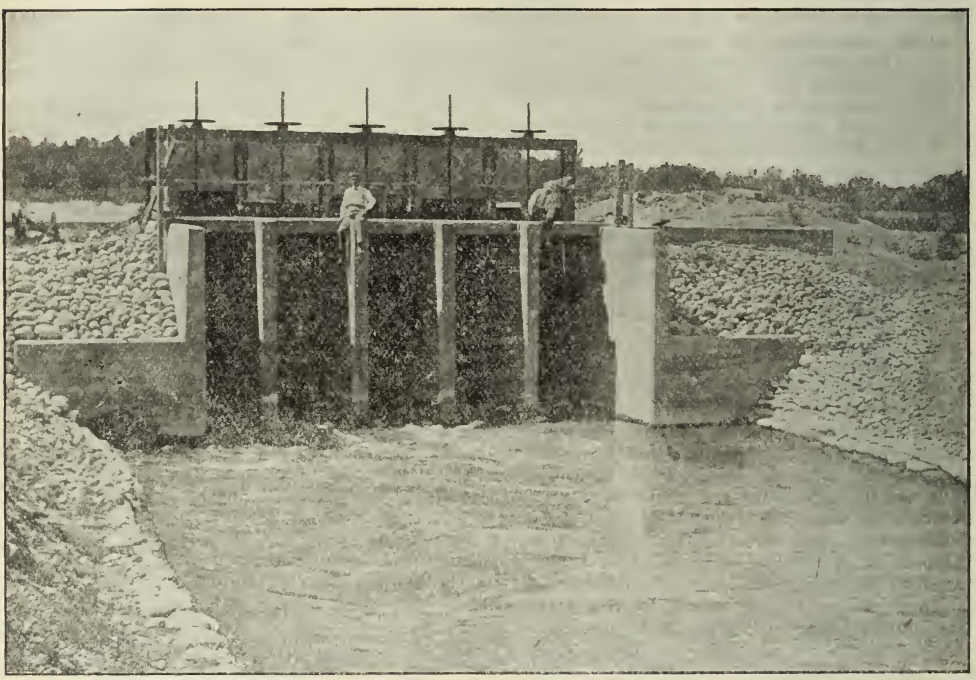
I also extended to each company the privilege of a brief statement as to the advantages derived or to be derived from the reclamation and settlement of their particular Project, and such replies as were received are given under the head of the different Projects.

BILLINGS PROJECT.

The Billings Project is the oldest one in the State, and under the present management it is rapidly approaching completion, and the best possible results seem to have been attained in their system of colonization as far as it has progressed. They advise me that an aggressive campaign will be taken up to complete the settlement of the project at the earliest possible date.

The details of this project are so fully set forth in the reply to the questions submitted by this office and by the statement of the company, that I need not go into the details further than to state that the land being reclaimed lies upon the "bench" just east of the city of Billings, Montana, and is officially known as Montana Segregation Lists Numbers 1 and 7, having a total acreage of Carey land of 15,058.11 acres at this time. The United States has patented to the State of Montana 8,193.88 acres of this segregation, and the State has issued patent to settlers on final proof for 5,982.50 acres.

During the two years from November 30th, 1910, to November 30th, 1912, there have been 16 sales made of Carey land on this project, amounting to 1,733.64 acres, which have brought into the State Treasury for the Carey Fund the sum of $3,483.28.



Headgate of Billings "Carey" Project.

STATEMENT OF BILLINGS PROJECT TO OCTOBER 31, 1912.

Name of project: Billings Bench.
Name of company: Billings Land & Irrigation Company.
Postoffice address: Billings, Mont.
County in which lands are situated: Yellowstone.
Description of location:
Altitude: 3,000 feet.
Topography: Bench land, generally smooth sloping north and east.
Soil: Sandy loam and clay loam.
Description of water supply:
Stream or streams from which water supply is obtained: Yellowstone River:
Whether running water or floods or both: Running water.
Number of reservoirs with area and capacity of each: None.
Water otherwise appropriated on stream: The supply is so large that prior appropriations are not considered.
Capacity of main canal leading from stream to land or reservoir: 360 cubic feet per second.
Length of main canal from intake completed: 54 miles.
Length of main canal from intake to be built: 7 miles:
Length of main and branch laterals completed: 85 miles.
Length of main and branch laterals to be built: 15 miles.
Total length of canals and laterals completed: 139 miles.
Total length of canals and laterals to be built: 22 miles.
General description of project:
Character of construction: Gravity system, following contour of valley on uniform grade.
Number and character of structures: Concrete headgate; 9 flumes, one 500 feet long and one 900 feet long, balance short; and 2 wooden stavepipe syphons.
Engineering difficulties: One tunnel 1,847 feet long through solid rock, and about 4,000 feet rock cut.



Tunnel on Billings "Carey" Project.

Total estimated cost of project: $450,000.00.
Total expenditures to October 31, 1912: $417,890.87.
Price of water right per acre for Carey Act lands: From $25 to $48, depending on character of land and location.
Price of water right per acre for lands owned by company: The lands of company with water rights are sold at $40 to $60 per acre, depending on character and location.
Price of water right per acre for lands other than company or Carey lands: $20 to $35 per acre, depending on location.
Terms of payment on water contracts: One-fourth cash, balance 10 annual installments; interest, 6 per cent.
Total number of acres within boundaries of project: About 34,000.
Total number of acres susceptible of irrigation for
Carey: About 10,200.
Private: About 3,300.
Railroad: About 12,400.
State: About 1,100.
Total number of acres to be actually irrigated by system: About 27,000.
What necessities for drainage system have arisen: Excess seepage in some localities, principally in one place where canal is in shale cut.
What character of drainage has been adopted and to what extent in actual construction: A complete under drain has been built for locality mentioned; wooden box drain 13,500 feet long.
What drainage is contemplated: Nothing beyond surface drains for waste water as required.
Number of acres of Carey land filed on: 7,309.98 acres.
Number of acres of Carey land filed on susceptible of irrigation: About 6,698.9.
Number of acres of Carey land open to entry: 6,690.
Number of acres of Carey land open to entry: 6,690.
Number of acres of Carey land open to entry susceptible of irrigation: About 3,600.
Amount of water per acre required to be furnished by Carey Land Act Board: One cubic foot per second per 100 acres.
Amount of water per acre actually required by the land: Not in excess of amount required to be furnished.
Method of measuring water to the farm units: By weirs.
Method of recording water delivery: So far our supply has been so far in excess of contracts that we have given all the farmer wanted and kept no record.



Main Canal Billings "Carey" Project.

BILLINGS LAND & IRRIGATION COMPANY.

Billings, Mont., November 21st, 1912.

Carey Land Act Board, Helena, Mont.

Gentlemen—Your letter of the 15th inst. received. Enclosed please find answers to questions asked, which are as accurate as I am able to make them. The irrigable areas will vary somewhat. To the cost, we should be permitted to charge interest on the amount disbursed, which has been no inconsiderable sum. The remaining construction contains but a small yardage at the extreme lower end and does not affect the lands in list one. Under the head of laterals I have included all laterals built and operated by the company; the laterals required on each tract of land sold to distribute the water over the land are built by the settler and we can only guess at their total length, at least 75 miles, which you can add, if desired.

As to the price of water rights,—our policy differs from that of other projects. There is a great difference in actual conditions on various portions of the land. Some tracts are easily irrigated from one lateral, the land is of better quality, its location as to roads, schools, markets, is better, etc. For such a tract the water is worth more than to a tract requiring water from several laterals, where the land is of poorer quality, etc. We have tried to be fair in apportioning prices so that the less desirable lands could be disposed of at their true value as compared with the whole project. We have found this plan to be satisfactory and have had no complaint.

We have tried to settle this project with desirable people. There is much that we do without added charge which in reality makes our price for Carey water very cheap. We give them the advantage of the credit of this

company as to rate of interest on deferred payments, we pay six per cent and we charge the same, while the current rate on farm security is eight per cent. We make no charge for water maintenance the first year and during the time I have been running this company it has cost us about $10,000 a year more than we have collected for this purpose. As most of the settlers come from non-irrigated country, we furnish a competent man to show them how to irrigate, etc. We generally put a portion of the land under plow for them, and for this purpose keep a power plowing outfit going all the time, and in many ways assist the new settlers, all of which, boiled down to dollars, has averaged to cost us so far about ten dollars an acre. It is quite an undertaking for a man with small means to bring a family out here from the East and attempt to make a farm out of sage brush. He requires help, instruction, and encouragement. We are pleased to say that our work along this line is bearing fruit and today we have a large number of prosperous farmers who were dependent on us at the start. We have just finished distributing two carloads of fine Holstein cows, shipped from Wisconsin, and expect to put in enough more so as to make it a good dairy district. This is but an example of our line of effort to build up and make profitable farming.



Main Canal Crossing Alkali Coule, Billings "Carey" Project.

Active construction work on this project was begun in the fall of 1903 and has been followed up as fast as the lands could be settled. The final work is now being completed. It will be of interest to note the actual results so far accomplished.

First—The total assessed valuation of all property embraced in this project in 1903 was about $35,000, and paid a total tax of about $700. Today the assessed valuation is about $700,000, and pays a tax of about $15,000. It has been made a large asset to the state, county and school district. It has paid for its own highways, schools, and its fair share of the general pub-

lic expense. In this respect the Carey projects differ greatly from the U. S. Reclamation projects. This county affords an example of each. The Huntley project is about the same size as this project, but as all the lands are taken up under the homestead laws they are not subject to taxation, while the homesteader enjoys and requires all the advantages that the other citizens have in the way of schools, highways, etc. The government canal is not taxed while ours is, it being the policy to tax the canal as an appurtenant to the unsettled Carey lands, and in this manner all the lands, whether patented or not, pay taxes.

The settlement of the Carey lands has been delayed by reason of the opening of the Huntley project; as to this we cannot complain, but it explains the matter. The opening of the Huntley project was widely advertised as a chance to get homesteads, tax free, no interest, etc.; this naturally got the people, so we had to wait until this was over. It is too late to correct it now, but it is unfair to the State and the county to impose the burden of building schools, highways, bridges, etc., as well as maintaining them, on projects that do not pay their share toward the cost. We are, of course, glad to have the Government come in and help in the development of the State; there is need of all that can be done, and no doubt this feature of it was not considered at the time, otherwise it would have been provided for. I am convinced, however, that in the actual working out, it would have proven better for all concerned had the State undertaken in proper manner at the beginning to bring about the reclamation of the irrigable lands through the means of the Carey Act. The work done in Idaho, I think, will bear me out in this.

At the present time there are on this project about 1,000 persons. There are six good modern schools, costing over $25,000; over 40 miles of graded road, rural mail and telephone service. There are 150 farms with about 7,000 acres now in alfalfa. That portion near Huntley is rapidly getting into sugar beets. A large nursery has been established on the project, and in many ways the property is being developed in a permanent manner which adds much to the agricultural importance of the Billings district.

The success of the settlers on the bench is rapidly attracting others, and we have every reason to expect the final work of settling the remaining lands will be completed in the near future.

Yours truly,

BILLINGS LAND & IRRIGATION COMPANY,

By R. E. SHEPHERD, President.

BIG TIMBER PROJECT.

The Big Timber Project is rapidly nearing completion and all important work and structures on what is known as the North Side Project are built. On the South Side Project only 1,320 acres have been reclaimed and it is doubtful if further reclamation of this segregation will ever be attempted on account of the excessive expense necessary for the limited area available, unless a pumping proposition is utilized.

The North Side Project is largely one of a storage system, and a description will be found in the statement of the company. It is officially known as Segregation Lists Numbers 2, 9 and 11, while the South Side Project is known as Segregation List No. 3. The total acreage segregated in these four lists is 22,087.83 acres. The acreage patented by the United States to the State of Montana in List No. 2 is 7,356.12 acres, while the amount of land patented by the State to settlers in the same list is 2,139.32 acres.

The amount of land sold during the two years from November 30th, 1910, to November 30th, 1912, is 2,280 acres, which at fifty cents per acre has brought into the Carey Fund in the State Treasury the sum of $1,140.00, and with the fees for applications, final proofs, patents and assignments, make a total of $1,219.00.

The statement of the company follows.



Intake Canal, Big Timber Project.

STATEMENT OF BIG TIMBER PROJECT UP TO OCTOBER 31, 1912.

Name of project: Big Timber Irrigation Project.
Name of company: Glass-Lindsay Land Company.
Postoffice address: Big Timber, Montana.
County in which lands are situated: Sweet Grass County.
Description of location:
Altitude: 4,200 to 4,650 feet above the sea level.
Topography: Rolling, with very considerable areas of level plain.
Soil: Sandy clay loam.
Description of water supply:
Stream or streams from which water supply is obtained: Sweet Grass, Big Timber and Otter Creeks.
Whether running water or floods or both: Both.
Number of reservoirs, with area and capacity of each: Three—
Otter Creek Reservoir, area 768 acres, and capacity of 22,390 acre-feet.

Otter Creek Reservoir, area 585.2 acres, and capacity of 9,000 acre feet.
Seven Mile Reservoir, area 58 acres, and capacity of 800 acre feet.

Length, size and capacity of main canals leading from stream to land or reservoirs:

Intake Canal from Sweet Grass Creek to Otter Creek Reservoir: Length 8,325 feet. Size, for a distance of 3.240 feet is 30 feet wide and has a depth of seven feet. Capacity of 1,200 second feet.

Big Timber Creek Canal: Length of canal, 9¾ miles. Size of canal ranges in its width from ten foot bottom at the upper end to a four foot bottom at the lower end, with an average depth of three feet. Capacity of canal ranges from 132 second feet to 19 second feet.

Adams Canal: Length of canal, 4¾ miles. Size, four feet wide. Capacity, 18 second feet.

Length of main canals from reservoirs completed: 32¼ miles.
Length of main canals from reservoirs to be built: None.
Length of main laterals completed: 52 miles.
Length of main laterals to be built: 24½ miles.
Length of distributing laterals completed: 14 miles.
Length of distributing laterals to be built: Indefinite.
Total length of canals and laterals completed: 98¼ miles.
Total length of canals and laterals to be built: Indefiinite.
General description of project:

Character of construction: The water for the entire project is supplied by gravity to the land by a complete system of distributing canals and reservoirs. The streams, the larger gulches and coulees are crossed with flumes.

Number and character of structures:
Headgate of re-inforced concrete.
35 flumes.
87 measuring or headgate boxes.
Two headgates, wooden structures.
Three drop flumes, wooden structures.

Engineering difficulties: Nominal.
Total estimated cost of project and colonization: $740,000.00.
Total expenditures to October 31, 1912: Approximately, $640,000.00.
Price of water right per acre for Carey Act lands: $60.00.
Price of water right per acre for lands owned by company: $60.00.
Price of water right per acre for lands other than company or Carey lands, $60.00.



Intake Canal, Spillway into Reservoir, Big Timber Project.

Terms of payment on water contracts: $5.00 per acre cash, balance 5 and 10 years at 6 per cent interest.
Total number of acres within boundaries of project: 28,415 acres.
Total number of acres susceptible of irrigation for

Carey: 6, 530 acres.
Private: 10,664 acres.
Railroad: None.
State: None.

Total number of acres to be actually irrigated by system: 17,194 acres.
What necessities for drainage system have arisen: Practically none.

What character of drainage has been adopted and to what extent in actual construction: None.
What drainage is contemplated: A few open ditches.
Number of acres of Carey land filed on: 4,254.94.
Number of acres of Carey land filed on susceptible of irrigation: 3,500 acres.
Number of acres of Carey land open to entry: 5,694 acres.
Number of acres of Carey land open to entry susceptible of irrigation: 3,432 acres.
Amount of water per acre required to be furnished by Carey Land Act Board: 1½ acre-feet for each acre of irrigable land.
Amount of water per acre actually required by the land: One acre-foot.
Method of measuring water to the farm units: None adopted as yet—supply more than ample, therefore no necessity for measuring.
Method of record of water delivery: No record kept on account surplus of water.

GLASS-LINDSAY LAND COMPANY.

Irrigated Lands.

Big Timber, Montana, December 3rd, 1912.

Mr. A. W. Mahon, State Engineer,
Secretary Carey Land Act Board,
Helena, Montana.

Dear Sir—Herein you will please find statement on the Big Timber Irrigation Project as outlined by list of questions recently furnished by your office.

In addition to the information contained in the report, it might be well to call your attention to the fact that:—

There are now four public schools to accommodate the settlers on and adjacent to the lands contained in this project, one of which has just barely been completed at Glasston, costing three thousand dollars.

The Glass-Lindsay Land Company, at its own expense, has purchased a very large improved road grading machine, and during the year 1912 has thoroughly graded, in most excellent manner, something like twenty miles of roads on the project, which it has thrown open for public use.

The company has, since the beginning of the settlement of these lands, at its own expense, each season furnished an experienced irrigator to teach the new settlers how and when to apply the water.

The company has been seriously handicapped in its financial operations by reason of the long delay on the part of the United States Land Department in the issuance of patent to the State of Montana for that portion of List No. 2 under the completed irrigation system, being a delay of nearly four years in which it took to secure these patents, and, as it was part of the company's finance arrangement to market settlers' mortgages with the proceeds of which to carry on some of its operations, you will easily see that no settlers' mortgages could be taken or marketed until after patents had been issued to them. That this unlooked for delay has seriously hampered it in its operations you will see when you stop to consider that the company pays eight per cent on borrowed money while it only receives six per cent from the settler; and further, that this company frequently has caused considerable plowing to be done in order to assist the settlers in getting a considerable amount of the land purchased under cultivation the first year, and the

company has also frequently assisted the settler in the way of credit for lumber and other supplies necessary to carry on his individual operations. As between this company and the settler, we feel as though our action in this matter has been well appreciated and has resulted in great good to the district as a whole.

We also wish to call your attention to the fact that while our contract with the Carey Land Act Board permits us to charge seventy-five cents per acre per annum as a maintenance charge, our individual contracts with purchasers contains the guarantee that the charge will not exceed forty cents per acre per annum so long as the system is under our control, and as a matter of fact, the charge so far has never exceeded twenty-five cents per acre per annum.

Respectfully submitted,
GLASS-LINDSAY LAND COMPANY,
By JAMES GLASS, General Manager.

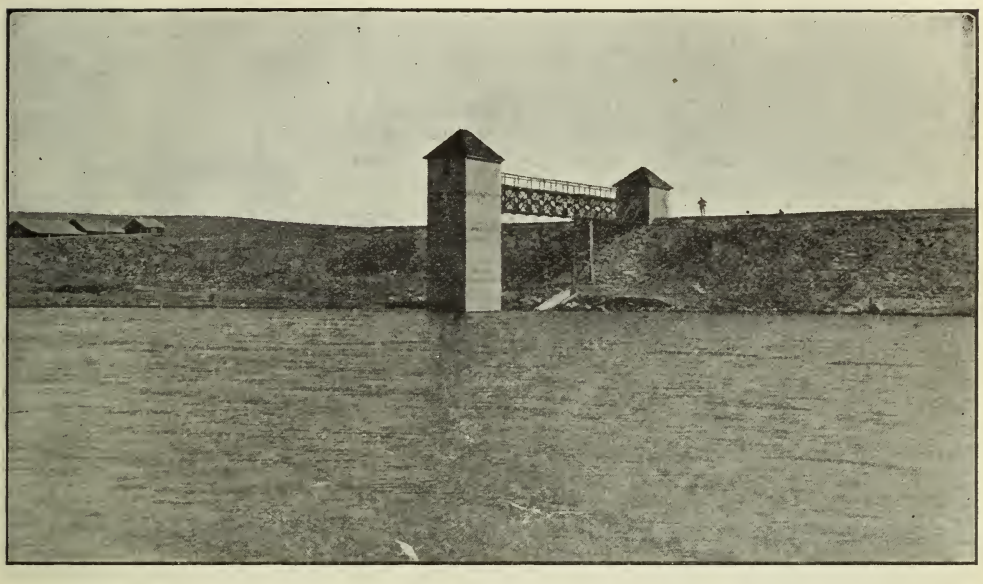
VALIER PROJECT.

The Valier Project is the largest Carey Act Project in the State. Its location and description is fully outlined in the statement of the company. It is officially known as Montana Segregation Lists No.s 8, 12 and 14, with a total segregation of 85,580.14 acres of Carey land.

During the two years from November 30th, 1910, to November 30th, 1912, there have been 3,744.60 acres sold in this project, which at 50 cents per acre to the State, has brought into the State Treasury the sum of $1,872.30. This sum, with the fees for applications, final proofs and assignments, make the total receipts from this project for the two years the sum of $2,074.30.

While this project was in financial stress in the past, it has now passed into the hands of a company which is in every way capable of pushing it to a successful completion, and the work done during the past year on construction has exceeded our fondest hopes. Nearly all of the land has been covered within striking distance from a main canal or lateral, and the only large pieces of work still to be completed are, namely, the Swift dam in the Birch Creek canyon, which is under construction and is contemplated to be finished June 1st, 1913, at a cost of approximately $350,000.00; and the Lake Frances dyke.

The Swift Dam is the most important structure on the project. It is one of the highest rock-filled dams in the country, and is of sufficient importance and interest to merit more than passing notice, and I insert a plan of its cross-section in this report. The dam was designed by Mr. William E. Swift, engineer in charge of the project, with Mr. Charles F. Ubelacher, chief engineer of the firm of Ford, Bacon & Davis, engineers, of New York City, and Mr. John R. Freeman, civil engineer, of Providence, R. I., as consulting engineers. I also called in a consulting engineer upon receipt of the plans, believing the character and importance of the structure warranted so doing, and the site and plans were given careful study and investigation be-



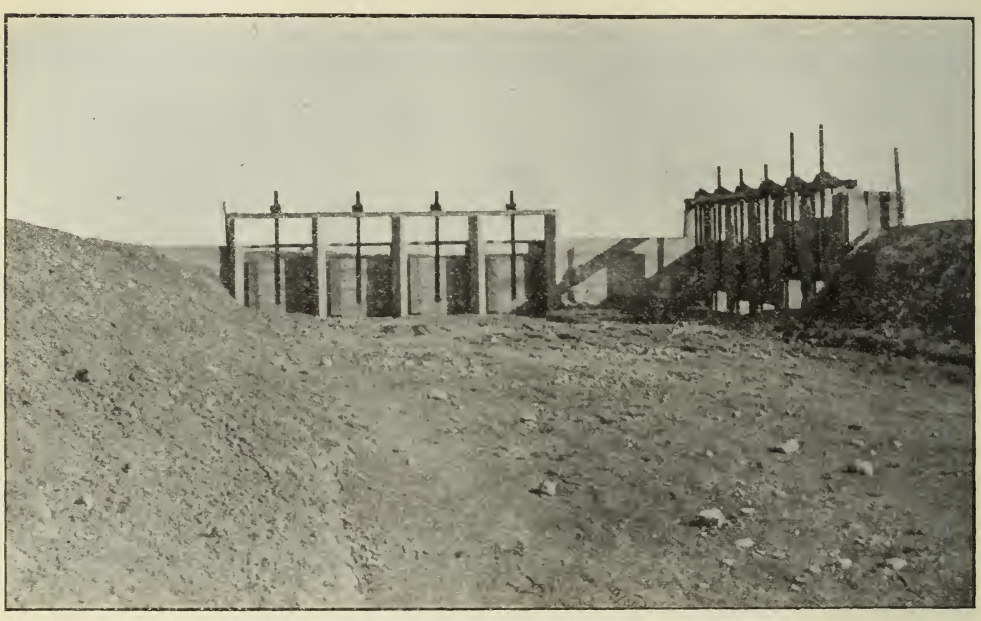
Lake Frances Dam, Valier Project.

fore approving them in behalf of the State.

The Lake Frances Dam, while impounding much more water, is an ordinary earth structure. The only interesting feature being the ill-advised plan of its original construction. A heavy bouble-barrel outlet tunnel was built through this structure along the original water course, with quicksand underneath and insufficient pile support to hold it in position, when it could just as well have been placed along the side of the hill with a sandstone foundation. The results are obvious, and upon my first visit of inspection I found it necessary to make a formal report to the Carey Land Act Board to the effect that the dam was in a serious condition and should not be used for impounding water until it was satisfactorily repaired. Mr. Swift proved equal to the emergency, however, and has made a good structure out of it at an expense of approximately $25,000.00. Other structures on the project were also in much need of remodeling, as built under the old company, but these defects are now all being corrected. The character of all structures on this project are first class, and designed and built according to the latest engineering practice, and the entire system will compare favorably with any irrigation project in the Northwest.

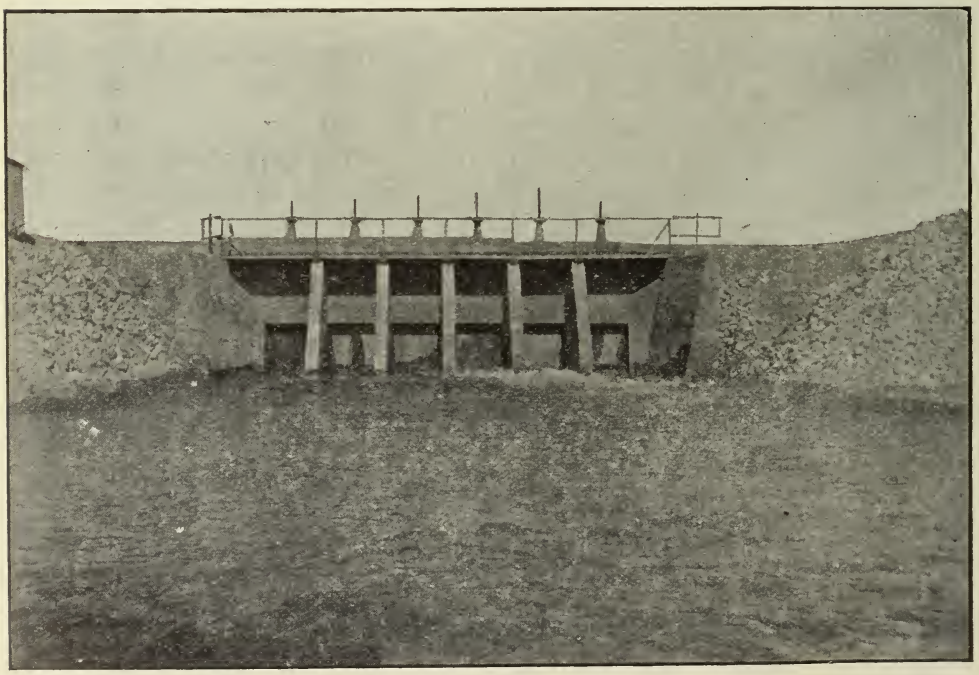
STATEMENT OF VALIER PROJECT TO OCTOBER 31, 1912.

Name of project: Valier Project.
Name of company: Valier-Montana Land & Water Company.
Postoffice address: Valier, Teton County, Montana.
County in which lands are situated: Teton County.
Description of location: The Valier Project is situated in Teton County in the northwestern and central part of Montana, extending three townships north, five townships west and two townships east of the town of Conrad. The tract lies in a gently-rolling, prairie-like country, clear of brush and trees. The land drains in a northeasterly direction with a grade of 50 feet to the mile to the Marias



Turnout on a Main Canal, Valier Project.

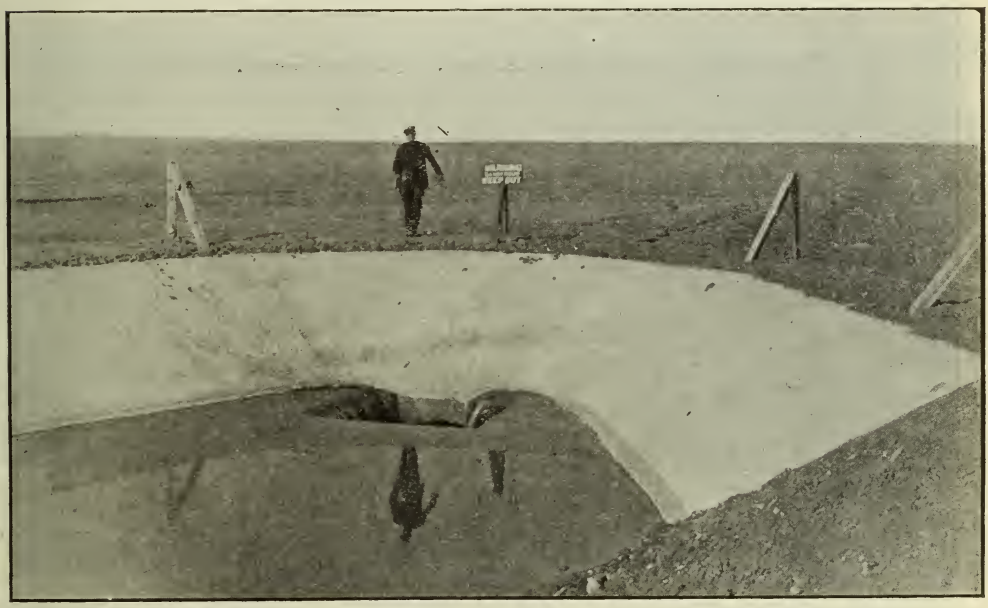
River. The altitude of the irrigable land is between 3,400 and 3,900, U. S. G. S. Datum. The soil throughout the project is fertile and deep beyond all practical requirements. Canal excavations and wells dug show that in places it attains a depth of nearly 80 feet. It consists of heavy loam in which the proper



Dupuyer Head Gate, Valier Project.

proportion of lime is large and of clay small. It is easily worked after first breaking and holds water well. The surface soil retains 60 per cent. of water when saturated, and the sub-soil 40 per cent. Owing to the arid climate the soil is unbleached and unwashed, and has retained an abundance of soluble salts, accounting for its high yields under cultivation.

Description of water supply: The water supply for this project is derived mainly from Birch Creek, a mountain stream flowing the year around from the east slope of the Rockies and of excellent quality. This creek drains an area of 185 square miles above the intake works of the Birch Creek Canal. At or near this intake the government and State has maintained a gauging station for a period of four years, from 1907 to date. These measurements indicate that all the years, with the exception of 1910, have been wet years. It further shows that the season's flow of this stream is not sufficient to take care of the project by direct flow, consequently a storage reservoir is being built. The flow from this stream is supplemented by the flow from Dupuyer Creek, which has a drainage area of 111 square miles, the joint drainage being 296 square miles. Flood waters to the extent of 900 second feet in Dupuyer Creek can be diverted into Dupuyer Creek Canal. The Birch Creek Canyon Reservoir, under economical operation, will probably take care of all the floods of that stream above the Swift dam. The waters of Birch Creek will be diverted into the Birch Creek Canal at a point about 12 miles below the Swift Dam. From that point this canal runs easterly



Intake for Lateral Drop in Tube. Valier Project.

to Dupuyer Creek and empties into the latter, where its waters are diverted into the Dupuyer Creek Canal. The Dupuyer Creek Canal, which ends in the "C 3" Canal, empties into the Lake Frances Reservoir. No general adjudication has been made of the rights on these two creeks, but the records and opinions of local engineers indicate that there are valid, prior water rights on Birch and Dupuyer Creeks, amounting to approximately 14,000 acre feet.

Reservoirs:

Birch Creek Canyon Reservoir covers an area of 455 acres and has a capacity of 31,355 acre feet.

Lake Frances Reservoir covers an area of 5,536 acres and has a capacity of 112,000 acre feet.

Canals leading from streams to land and reservoir:

Birch Creek Canal is 13.9 miles long and has a capacity of 700 cubic feet per second.

Dupuyer Creek Canal is 3.7 miles long and has a capacity of 900 cubic feet per second.

The Dupuyer Creek Canal empties into the "C 3" Canal, which is 2.2 miles long and has a capacity of 900 cubic feet per second.

Pondera Canal is 29.3 miles long and has a capacity of 163 cubic feet per second.

Main canals:

Birch Creek Canal is 9.5 miles completed.
Dupuyer Creek Canal is 3.7 miles completed.
"C 3" Canal is 2 miles completed.
Pondera Canal is 29.3 miles completed.
Birch Creek Canal has 4.4 miles to be enlarged.
"C 3" Canal has .2 mile to be enlarged.

Main laterals:

Length of main laterals completed is 123.7 miles.
Length of main laterals to be built is 10 miles.

Distributing laterals:

Length of distributing laterals completed: 274.4 miles.
Length of distributing laterals to be built: 17.6 miles.



Outlet of Lateral Drop in Tube, Valier Project.

Canals and laterals completed:

Total length of canals and laterals completed: 477.2 miles.
Total length of canals and laterals to be built: 27.6 miles.

General description of project: The canals and structures on the project are built according to the most up-to-date engineering practices. Most of the canals are built for possible larger capacities in the future, and are of more than ample size to take care of all present and future needs. Wherever possible all structures on the main canals and laterals are solidly built of reinforced concrete. The principal structures on the project are:

The Swift Dam: A concrete-faced, rock-fill dam in Birch Creek Canyon, 160 feet high and 400 feet long on top with tunnel outlet.

Earth and Rock Fill Dyke: 40 feet high and 400 feet long on top. This dyke is 700 feet north of the Swift Dam.

Concrete-lined spillway for above reservoir, which is cut through solid rock and will have a capacity of about 10,000 cubic feet per second, with a free-board of eight feet above this discharge. The drainage basin above this dam is approximately 120 square miles in the Rocky mountains.

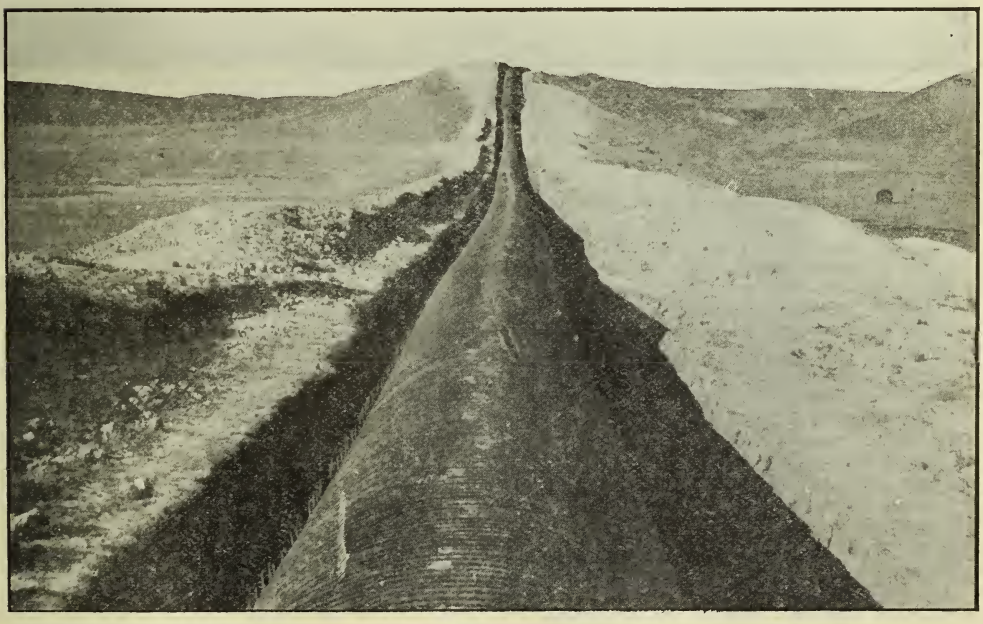
Lake Frances Dam: An earth dam 40 feet high and 600 feet long on top, with reinforced concrete core-wall and double 53" barrel culvert outlet and gate tower.

Lake Frances Dyke: An earth dyke 18 feet high and 1,200 feet long, with reinforced concrete outlet culvert and tower.

Big Flat Coule Syphon: This consists of 1,000 feet of concrete pressure pipe 7 feet in diameter and 3,000 feet of wood stave pipe 78 inches in diameter, with intake



Birch Creek Canyon, Site of the Swift Dam on the Valier "Carey" Project.



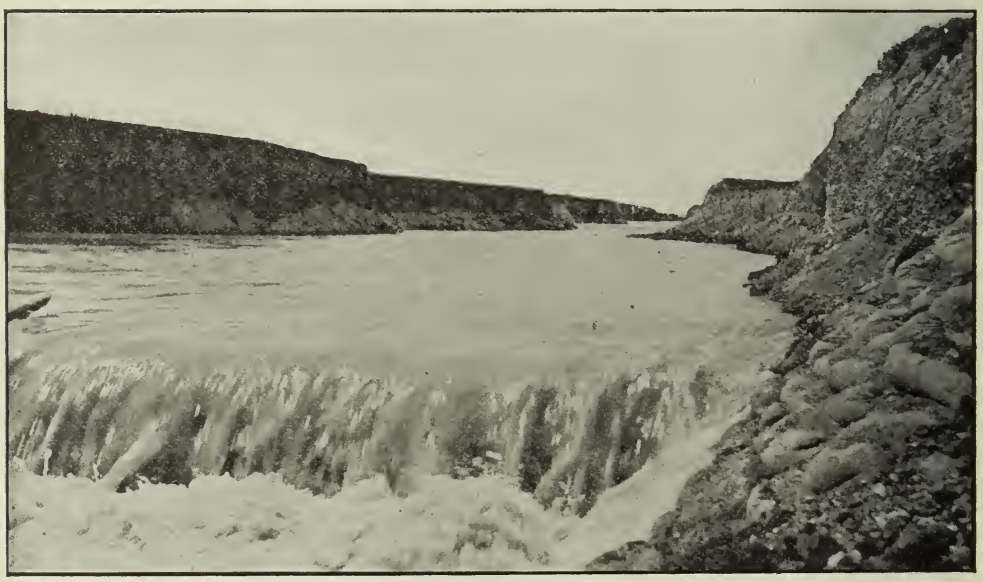
Big Flat Coule Syphon, Valier "Carey" Project.

and outlet structures. The wood stave pipe is under 160-foot head at the lowest point of the coulee and has a capacity of 375 second feet.

Birch Creek Diversion Dam: Located on Birch Creek about 12 miles below the Swift Dam. This consists of a concrete diversion dam across Birch Creek and massive concrete headgates. It diverts the waters of Birch Creek into the Birch Creek Canal.

Two reinforced concrete drops on the Birch Creek Canal: One is a 5-foot drop with a capacity of 700 second feet; the other is an 11-foot drop of the same capacity.

Concrete and timber drops on the Birch Creek and Dupuyer Creek Canals: About 80 feet of excess grade in the Birch Creek Canal is taken care of by about 35 timber and concrete drops. These drops consist of heavy timber aprons and floors with concrete wing-walls, and make drops of about 2½ feet each. In the Dupuyer Creek Canal there are six of these drops of about the same size.



Birch Creek Canal, Valier "Carey" Project showing Series of Low Drops.

Dupuyer Creek Headgates and Diversion Weir: A diversion weir reaches across Dupuyer Creek and diverts the waters of this creek into the Dupuyer Creek Canal. The whole structure is built solidly of concrete.

Little Flat Coule Syphon: This will be built at the present end of the "S" Canal, to carry the water across Little Flat Coule and will be about 3,000 feet in length, having a capacity of 70 cubic feet per second. It will be built of wood stave pipe with concrete intake and outlet structures.

Drops: In constructing drops on the project the system has been followed of using reinforced concrete wherever the capacity of the canal was more than 20 cubic feet per second. Where it amounted to less than 20 cubic feet timber was used.

Turnouts: All turnouts from main canals and main laterals which have a capacity of more than 60 cubic feet per second have been constructed of reinforced concrete. Where the capacity of the main canal or distributing canal is less than 60 cubic feet per second timber turnouts have been constructed.

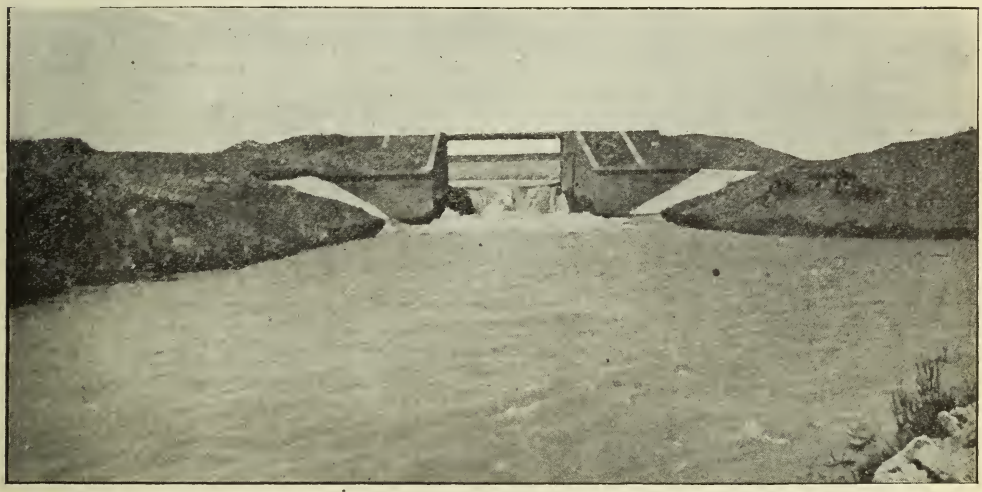
Checks: A number of checks have been placed in main canals and main laterals. These have been constructed of reinforced concrete.

Bridges: About 300 bridges have been constructed on county and other roads. They have been designed according to state and county regulations to carry a 15-ton traction engine or a distributed load of 20,000 pounds. About 100 more will be built.

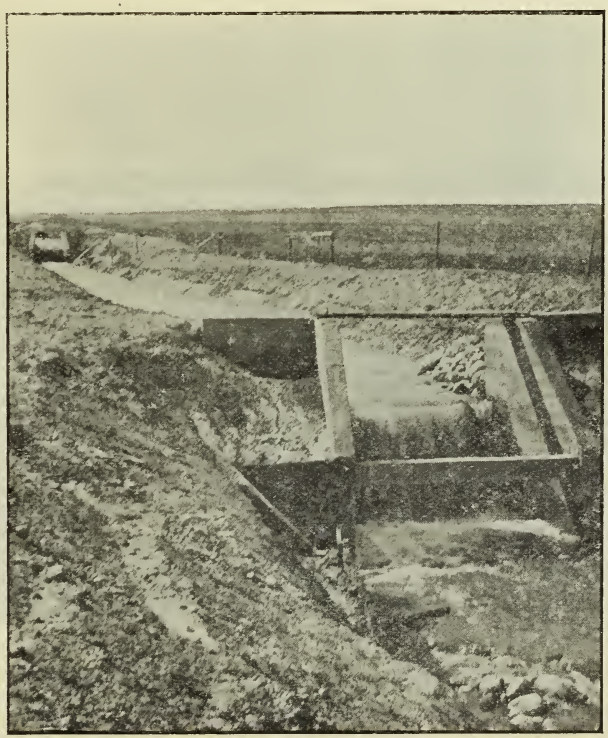
Timber drops, checks, division boxes and rating flumes: About 500 checks, drops, division boxes and rating flumes have been built for the proper distribution of the water. These are all of timber. Three hundred and fifty will be built in the spring of 1913.

Estimated cost of project: $4,304,596.82.

Expenditures to October 31, 1912: $3,172,596.82.
Price of water right per acre: The price of water right for Carey Act lands, lands owned by the company, and lands not controlled by the company is $40.00 per acre.
Terms of payment: $5.00 per acre down, the balance payable in 14 years with 6 per cent. interest on deferred payments.

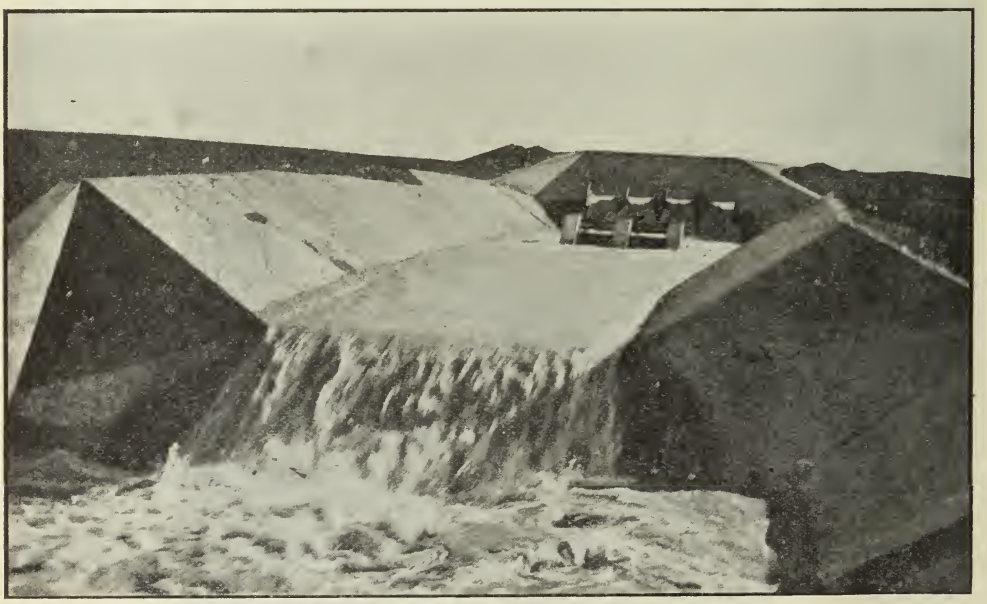


Drop on a Main Lateral, Valier "Carey" Project.



Drops in Distributing Laterals, Valier Project.

Acreage within boundaries of project: 199,324 acres.
Acreage susceptible of irrigation:
Carey Act lands: 85,497.34 acres segregated, of which 76,814.34 (*) acres are irrigable.
Company and Pondera lands: 45,460.48 acres, of which 38,286.48 (*) acres are irrigable.
Private lands: 38,367.04 acres, of which 36,366.43 (*) acres are irrigable.
Acreage to be actually irrigated by system: 115,100.82 (*) acres.
Drainage: All portions of the project are well drained, and with reasonable care any danger that the soil will become water-logged or alkaline can be avoided.
Carey land: Number of acres filed on, 26,843 acres, November 1, 1912.
Carey land filed on susceptible of irrigation: 22,280 acres. (**)
Carey land open to entry: 58,654.34 acres.
Carey land open to entry susceptible of irrigation: 48,683 acres. (**)
Amount of water per acre required to be furnished: 1½ acre feet.
Amount of water per acre actually required by the land: The management of the project is of the opinion that after irrigation has been practiced on any part of the lands for a few years the duty of the water will increase 50 per cent., making the requirement about one acre foot.
Method of measuring water to the farm units: Over 300 rating flumes are in use at present.
Method of recording water delivery: Written application is made by the user, which is placed in locked mail box on headgate. This is taken up by ditch rider each day, and sent to general office, with ditch rider's report. The same method is pursued in asking for the turn-off of water. This slip also is sent to general office and is filed with ditch riders' report, the two together showing the time of use, which with the ditch riders' report shows the amount of water used. Records of all water deliveries are kept by name and number of entry, also giving description of the entry, in the general office. A complete set of all forms and records used in making water deliveries and office records attached.
Note: (*) Topography estimate.
Note: (**) 83 per cent. of actual acreage.



Lateral Drops in Open Chute, Valier Project.

VALIER-MONTANA LAND AND WATER CO.

Irrigated Lands.

Valier, Montana, November 26th, 1912.

Mr. A. W. Mahon, State Engineer, Helena, Montana.

My Dear Mr. Mahon—We are mailing you the information you asked for. * * * * *

The statement enclosed with this letter, is in reply to the questions you sent us from your office. This data was furnished by the engineer's office, excepting the estimated cost of the project, and the amount expended up to October 1st, 1912.

The statement as prepared by the engineer in charge, seems so complete that I see nothing to add, except perhaps the average yields per acre on the project this year. * * * * *

The project is rapidly settling up with the best class of settlers that I have ever known on a new project.

The assessment rolls of the county show an increase in valuation in the last three years of over $6,000,000.00. The Valier Project should have credit for at least ONE-HALF of this increase.

With kindest regards and best wishes, I am.

Very truly yours,

W. L. CAMPBELL, Assistant Manager.

Seepage Records on Valier Project Canals.

The engineers of the Valier "Carey Land Act" Project have started a series of records on their more important canals, to ascertain the percentage of loss in each. As this work was only initiated during the past season (1912), satisfactory records are only available on the three principal canals, and the results of the observations are tabulated as follows:

SEEPAGE RECORDS.

Valier "Carey Project."

Canal.	No. of Gauging Stations...	Length—Miles.....	Average Discharge—Sec.-ft.	Average Loss By Seepage—Sec.-ft.....	Per Cent of Average Flow Lost By Seepage.....	Per Cent Seepage Per Mile.....	Maximum Discharge—Sec.-ft.....	Estimated Maximum Loss By Seepage—Sec.-ft.....	Character of Soil.
Birch Creek ..	4	13.82	72.0	10.1	14.0	1.01	700	96.0	Fine, soapy, material and gravel.
Dupuyer	2	3.5	117.6	.3.0	2.55	0.73	900	23.0	Sand, clay and gravel.
Pondera	4	5.7	20.4	1.0	4.9	0.86	163	7.7	Clay and sand.

TETON PROJECT.

The Teton Project is officially known as Montana Segregation List No. 10, and contains 55,393.82 acres of "Carey" land at this time. It is located only a short distance from the Valier Project and upon practically the same character of soil. It is on a rolling bench but is not as irregular as the Valier lands. This project awaits the approval of the authorities at Washington. The statement of the company follows:

STATEMENT OF THE TETON PROJECT.

Name of project: The Teton Project.
Name of company: The Teton Co-Operative Reservoir Company.
Postoffice address: Helena, Montana.
County in which lands are situated: Teton County.
Description of location:
Altitude: 4,100 feet.
Topography: Gently rolling prairie land.
Soil: Sandy loam.
Description of water supply:
Stream or streams from which water supply is obtained: Flood waters of Teton River, Blackleaf and Muddy Creeks.
Whether running water or floods or both: Both.
Number of reservoirs with area and capacity of each: Capacity reservoir, 106,700 acre feet; area, 4,160 acres.
Canals leading from stream to land or reservoir:
Teton Diversion: Length 3½ miles, size 58 feet at water line, capacity 1,090 second feet.
South Fork or Muddy Diversion: 1⅛ miles, size 68 feet, capacity 866 second-feet.
North Fork or Blackleaf: 5 miles, size 28 feet, capacity 250 second feet.
Length of main canal from reservoir completed: None.
Length of main canal from reservoir to be built: 59 miles.
Length of main laterals completed: None.
Length of main laterals to be built: Not determined.
Length of distributing laterals completed: None.
Length of distributing laterals to be built: Not determined.
Total length of canals and laterals completed: Teton Diversion, 3½ miles.
Total length of canals and laterals to be built: Not determined.
General description of project:
Character of construction: Earth dam, rolled and puddled.
Number and character of structures: Concrete outlet pipe to reservoir.
Total expenditures to October 31, 1912: $213,658.60.
Price of water right per acre for Carey Act lands: Not known.
Price of water right per acre for lands owned by company: No lands owned by company.
Total number of acres within boundaries of project: 55,000 acres.
Total number of acres susceptible of irrigation for Carey: 42,000 acres.
Total number of acres to be actually irrigated by system: 42,000 acres.
Number of acres of Carey land open to entry: All of project.
Number of acres of Carey land open to entry susceptible of irrigation: 42,000.
Amount of water per acre required to be furnished by Carey Land Act Board: Not determined.
Amount of water per acre actually required by the land: Not decided.

MUSSELSHELL PROJECT.

The Musselshell Project is officially known as Montana Segregation List No. 13, and consists of 20,334.21 acres of fertile land on the bench along the upper Musselshell River, most of which is in the vicinity of Harlowton. This project is awaiting approval, of the General Land Office at Washington.

The statement of the company follows:

STATEMENT OF THE MUSSELSHELL PROJECT.

Name of project: Musselshell Irrigation Project.
Name of company: Musselshell Development Company.
Postoffice address: Box 816, Helena, Montana.
County in which lands are situated: Meagher.
Description of location:
Altitude: 4,250 feet for Carey land, some other 4,800 to 5,000.
Topography: Nearly all the Carey land smooth benches; the other land more rolling in part.
Soil: Mostly deep, very fertile, clay loam.
Description of water supply:
Stream or streams from which water supply is obtained: North and South Forks of Musselshell River and their tributaries.
Whether running water or floods or both: Both flood and running
Water otherwise appropriated on stream: Streams not adjudicated, some void filings. No compilation of appropriations yet made. Five years of stream measurements show much available water.
Number of reservoirs with area and capacity of each: Five reservoir sites located—695 acres, 28,768 acre feet; 296 acres, 4,189 acre feet; 392 acres, 4,842 acre feet; 374 acres, 3,784 acre feet; 108 acres 1,779 acre feet.
Canal leading from stream to land and reservoirs:
Length: Approximately 40 miles to cover all the land.
Size: At intake 8 feet deep, 15 feet wide at bottom. This is reduced from place to place as area to irrigate becomes less.
Capacity of main canal: At intake 363 second feet.
Length of main canal from reservoir completed: None.
Length of main canal from reservoir to be built: The channel of North Fork of Musselshell will convey from the large reservoir to diversion point main canal.
Length of main laterals completed: None.
Length of main laterals to be built: Not definitely determined, as a modification of original plans is under consideration.
Length of distributing laterals completed: None.
Length of distributing laterals to be built: Not definitely determined.
Total length of canals and laterals completed: None.
Total length of canals and laterals to be built: Not definitely determined.
General description of project:
Character of construction: Five, perhaps more, reservoirs. Main canal mostly dirt excavation; a little flume and rock work.
Total estimated cost of project: Estimate incomplete, is being revised.
Total expenditures to October 31, 1912: Nominal.
Price of water per acre for Carey Act lands: Not yet fixed.
Price of water right per acre for lands owned by company: Not fixed.
Price of water right per acre for lands other than company or Carey lands: Not yet fixed.
Terms of payment on water contracts: Not fixed.
Total number of acres within boundaries of project: 85,000 approximately.
Total number of acres susceptible of irrigation:
Carey: 20,000.
Private, Railroad and State: 55,000, if there was sufficient water.
Total number of acres to be actually irrigated by system: 35,000.
What necessities for drainage system have arisen: Probably very little drainage will be required.
What character of drainage has been adopted and to what extent in actual construction: None.
What drainage is contemplated: Nearly all the land is on bench, and the slope and other conditions are such that natural drainage will probably suffice.
Number of acres of Carey land filed on: None.
Number of acres of Carey land filed on susceptible of irrigation: None.
Number of acres of Carey land open to entry: 20,000.
Number of acres of Carey land open to entry susceptible of irrigation: Probably all the 20,000.
Amount of water per acre required to be furnished by Carey Land Act Board: Not specified yet.
Amount of water per acre actually required by the land: Probably 1½ acre feet ample.
Method of measuring water to the farm units: Not prescribed yet.
Method of recording water delivery: Not prescribed yet.

Note: Additional reservoir sites are available and investigation of them will be begun about December 1. After such investigation an enlargement or modification of present plans may be made.

RUBY PROJECT.

The Ruby Project is officially known as Montana Segregation List No. 16, and consists at this time of 6,825.01 acres of excellent land on the bench between the Ruby and Beaverhead rivers. The segregation is awaiting the approval of the General Land Department at Washington.

The following statement is made by the company:

STATEMENT OF RUBY PROJECT.

Name of project: Ruby.
Name of company: R. A. Carnochan.
Postoffice address: Butte, Montana.
County in which lands are situated: Madison and Beaverhead.
Description of location:
Topography: Level, sloping to north.
Soil: Deep alluvial wash.
Altitude: 5,000.
Description of water supply:
Stream or streams from which water supply is obtained: Ruby River.
Whether running water or floods or both: Running and storage of flood.
Number of reservoirs with area and capacity of each: One, 2,076 acres, storing 100,000 acre feet.
Canal leading from stream to land or reservoir:
Length: Five miles.
Length of main canal from reservoir completed: None.
Length of main canal from reservoir to be built: 51 miles.
Length of main laterals completed: None.
Length of main laterals to be built: 20 miles.
Length of distributing laterals completed: None.
Length of distributing laterals to be built: 35 miles.
Total length of canals and laterals completed: None.
Total length of canals and laterals to be built: 106 miles.
General description of project:
Character of construction: Earth, steel and concrete.
Number and character of structures: Total not arrived at, probably 75.
Engineering difficulties: 125-foot earth dam.
Total estimated cost of project: $1,750,000.00.
Total expenditures to October 31, 1912: $10,800.00.
Price of water right per acre for Carey Act lands: Not determined.
Price of water right per acre for lands owned by company: Not determined.
Price of water right per acre for lands other than company or Carey lands: Not determined.
Terms of payment on water contracts: Not determined.
Total number of acres within boundaries of project: 45,000.
Total number of acres susceptible of irrigation for
Carey: 6,825.
Private, 15,000.
Railroad, 8,520.
State: 14,000.
Total number of acres to be actually irrigated by system: 40,000.
What necessities for drainage system have arisen: None.
What character of drainage has been adopted and to what extent in actual construction: None.
What drainage is contemplated: None.
Number of acres of Carey land filed on: None.
Number of acres of Carey land filed on susceptible of irrigation: None.
Number of acres of Carey land open to entry: All.
Number of acres of Carey land open to entry susceptible of irrigation: All.
Amount of water per acre required to be furnished by Carey Land Act Board: Not determined.
Amount of water per acre actually required by the land: 1.5 acre feet per annum.
Method of measuring water to the farm units: None.
Method of record of water delivery: None.

FLATWILLOW PROJECT.

The Flatwillow Project is officially known as Montana Segregation List No. 21, and consists of 7,768.80 acres of fertile bench lands in eastern Fergus County. It is awaiting the approval of the Washington authorities and the following statement of the company gives all necessary details.

STATEMENT OF FLATWILLOW PROJECT.

Mr. A. W. Mahon, State Engineer. Helena, Montana:

Dear Sir—Replying to your circular letter of November 23rd, I beg leave to make the following report with reference to the Flatwillow Project in Fergus County, Montana:

The name of the project is generally known as the "Flatwillow Project," but the name of the company is "The Fergus County Land & Irrigation Company," duly incorporated, whose postoffice address is Lewistown, Mont., care of the undersigned as president.

The lands are located in eastern Fergus County, the altitude of which is about 3,000 feet, lying principally between Flatwillow Creek and Yellow Water Creek, a tributary of Elk. Creek, on a bench sloping gently to the northeast, with good soil of a sandy loam character, and the general topography is such as to insure good drainage, and of sufficient slope for good irrigation purposes.

There are approximately 9,000 acres withdrawn under the Carey Act, running down on a bench a short distance below the reservoir, and in connection with the Carey land withdrawn, the project is capable of irrigating approximately ten or twelve thousand acres of land owned by private ownership, and several school sections as yet the property of the state.

The water supply is obtained from Flatwillow Creek, a large and permanent stream of water, and it is the intention to use both running and flood waters by a diversion ditch.

The water was appropriated by our company by a duly recorded instrument and by a diversion of the waters of Flatwillow Creek into a basin which forms one of the tributaries of Pike Creek.

The system consists of one principal reservoir with an intake ditch about two miles long, twenty feet wide on the bottom, and thirty feet on top, which intake ditch is completed at the present time.

The capacity of the main canal leading from Flatwillow Creek to the reservoir is figured upon the proposition of one-eighth of an inch fall, and a canal twenty feet wide at the bottom, and approximately twenty-five feet wide at the water line, between four and five feet of water.

The dam is located in a V shape canyon, with hard shale of rocks on either edge, and a temporary dam is constructed at the present time, about thirty feet high, and contains about twenty thousand rods of earth, which, however, is located at the upper edge of what will be the completed dam when completed.

The main laterals when completed will be about twelve miles in length, which will include a metal flume across Pike Creek, and covering the bench between Flatwillow and Yellow Water.

The character of the construction and the engineering difficulties encountered are at the dam, and it has been decided to construct a concrete core, which shall be started from solid bed rock in the bottom of the canyon, as well as the other side.

The formation of the soil in and around the dam is such that we are satisfied that it will be impossible to keep it from seeping.

The estimated cost of the project is $150,000.00, of which $15,000.00 has been spent on the intake ditch, and the partial construction of the dam. For a distance of one mile below the dam it will be necessary to face the main ditch leading from the dam with concrete, as the formation is of a shale character, and to avoid seepage would have to be faced with concrete. It will require a steel flume about 1,500 feet in length to convey the waters across Pike Creek to the Carey land, and another ditch intended to reclaim the lands between Flatwillow and Pike Creeks held under private ownership, which can be readily constructed, as the slope is gentle to the northeast, and makes a very fine project to cover about 6,000 acres of land in this particular part.

The total number of acres that can be irrigated by the project can be sub-divided as follows:

Carey	8,000
Private	15,000
Railroad	2,000
State	1,280
Total	26,280

The capacity of the water supply is assured beyond question. The capacity storage dam when completed will be 20.000 acre feet, and there are sufficient permanent waters

running in the spring and fall to keep the dam filled at all times, and in flood times it will be an easy matter to obtain water enough to keep the dam full to the first day of July of each year, and thus insure a plentiful supply of water for the months of July and August. Thereafter the permanent waters can fill the dam.

All the land herein described is susceptible of irrigation by the project, and the amount of water required per acre would not exceed one acre foot per season.

The measurement of the waters of Flatwillow Creek can be obtained in your office, as the measurement has been kept for the past two years.

The cost of water per acre is problematic at this time, depending upon the character of the construction of the dam. However, the project is a very simple one. There are no engineering difficulties to overcome, save and except that of the water tight dam, and as above stated we have come to the conclusion that it will require a thorough and well constructed concrete core in order to insure a permanent dam, owing to the character of the ground that is available for the construction thereof.

The intake ditch on this project, which is completed, is located across lands that have been bought by warranty deed from private ownership and from the State of Montana, and is the property of the Fergus County Land & Irrigation Company, and duly recorded.

The project is not yet approved by the Interior Department as far as the Carey land and reservoir locations are concerned, and we understand is held up on account of a more complete information relative to the water supply, which is being conducted by the State and Government co-jointly as to the flood waters of said Flatwillow Creek, and reference to said report is hereto made.

Respectfully submitted on this, the 27th day of November, 1912.

FERGUS COUNTY LAND & IRRIGATION CO.
By DAVID HILGER, President.

LITTLE MISSOURI PROJECT.

The Little Missouri Project is officially known as Montana Segregation List No. 22, and contains 20,622.91 acres of Carey land at this time and is located in the Little Missouri River valley in the southeastern corner of the State. This project also awaits the approval of the authorities at Washington.

The statement of the company follows:

STATEMENT OF THE LITTLE MISSOURI PROJECT.

Name of project: Little Missouri.
Name of company: Little Missouri Land & Irrigation Company.
Postoffice address: Butte, Montana.
County in which lands are situated: Custer (southeastern part).
Description of location:
Altitude: 3,000 feet.
Topography: Generally level valley land.
Soil: It varies—sandy loam, clay loam and heavy clay.
Description of water supply:
Stream or streams from which water supply is obtained: Little Missouri River and tributary, Cottonwood Creek.
Whether running water or floods or both: Running and flood.
Number of reservoirs with area and capacity of each: One, Area, 1,500 acres; capacity, 20,000 acre feet.
Water otherwise appropriated on stream: One prior appropriation.
Canal leading from stream to reservoir:
Length: 5½ miles.
Size: 6 feet in depth by 17 feet in width at bottom.
Capacity: 500 second feet.
Length of main canal from reservoir completed: None.
Length of main canal from reservoir to be built: 24½ miles.
Length of main laterals completed: None.
Length of main laterals to be built: 8½ miles.
Length of distributing laterals completed: None.
Length of distributing laterals to be built: Not determined.
Total length of canals and laterals completed: None.
Total length of canals and laterals to be built: All.

General description of project:
Character of construction: Storage system and natural flow.
Number and character of structures: Three steel flumes; inverted syphon of reinforced concrete; concrete headgate with a 5x5 foot battery of cast iron gates; diversion dam, structural steel frame, operating between concrete piers; waste-ways and drops, concrete; typical wooden and vitrified pipe turnouts.
Engineering difficulties: None.
Total estimated cost of project: $300,000.00.
Total expenditures to October 31, 1912: Nominal.
Price of water right per acre for Carey Act lands: Not determined.
Price of water right per acre for lands owned by company: Not determined.
Price of water right per acre for lands other than company or Carey lands: Not determined.
Terms of payment on water contracts: Not determined.
Total number of acres within boundaries of project: 38,502.91.
Total number of acres susceptible of irrigation for
Carey: 19,000.
Private: 2,040.
State: 3,520.
What necessities for drainage system have arisen: None.
What character of drainage has been adopted and to what extent in actual construction: None.
What drainage is contemplated: Open ditch.
Number of acres of Carey land filed on: None.
Number of acres of Carey land filed on susceptible of irrigation: None.
Number of acres of Carey land open to entry: None.
Number of acres of Carey land open to entry susceptible of irrigation: None at this time.
Amount of water per acre required to be furnished by Carey Land Act Board: Not yet determined.
Amount of water per acre actually required by the land: Not yet determined.

RED ROCK PROJECT.

The Red Rock Project was officially known as Montana Segregation List No. 18, and was comprised of 7,885.52 acres. The segregation was cancelled and land relinquished by the Board December 26th, 1911.

FRANKLIN PROJECT.

The Franklin Project was officially known as Montana Segregation List No .15, and consisted of 5,142.30 acres. This segregation was cancelled and the land relinquished by the Board August 12th, 1912 .

DEARBORN PROJECT.

The Dearborn Project was officially known as Montana Segregation Nos. 5 and 6, consisting of 36,536.42 acres. These segregations were cancelled, the contract with the company declared void on November 8th, 1911, and the land relinquished to the U. S. Government.

SUMMARY OF PROJECTS.

Billings Project	Approved List No. 1	10,472.88	acres.
Big Timber Project	Approved List No. 2	7,864.78	acres.
Big Timber Project	Approved List No. 3	11,153.73	acres.
Billings Project	Approved List No. 7	4,585.23	acres.
Valier Project	Approved List No. 8	60,461.41	acres.
Big Timber Project	Approved List No. 9	1,360.00	acres.
Teton Project	Pending List No. 10	55,393.83	acres.
Big Timber Project	Approved List No. 11	1,709.32	acres.
Valier Project	Approved List No. 12	3,596.58	acres.
Musselshell Project	Pending List No. 13	20,334.21	acres.
Valier Project	Approved List No. 14	21,522.15	acres.
Ruby Project	Pending List No. 16	6,825.01	acres.
Flatwillow Project	Pending List No. 21	7,768.80	acres.
Little Missouri	Pending List No. 22	20,622.91	acres.
TOTAL of		233,670.84	acres.

APPROVED CAREY LAND SALES.

Billings Project	7,716.14 acres.
Big Timber Project	4,572.94 acres.
Valier Project	25,051.49 acres.
Total Carey lands sold	37,340.57 acres.

U. S. PATENTS ISSUED TO STATE OF MONTANA.

On Billings Project	8,192.88 acres.
On Big Timber Project	7,356.12 acres.
Total of	15,549.00 acres.

PATENTS ISSUED BY STATE TO SETTLERS.

On Billings Project	5,982.50 acres.
On Big Timber Project	2,139.32 acres.
Total of	8,121.82 acres.

FINANCIAL STATEMENT.

Receipts by the Carey Land Act Board—	
From Nov. 30th, 1910 to Nov. 30th, 1911	$1,534.19
From Nov. 30th, 1911 to Nov. 30th, 1912	5,252.44
Total Receipts	$6,786.63
Disbursements for same period	$5,199.68
Balance	$1,586.95

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Note—(misc.), refers to miscellaneous measurements made at points other than regular gaging stations.

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